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DEPARTMENT OF THE ARMY FIELD MANUAL

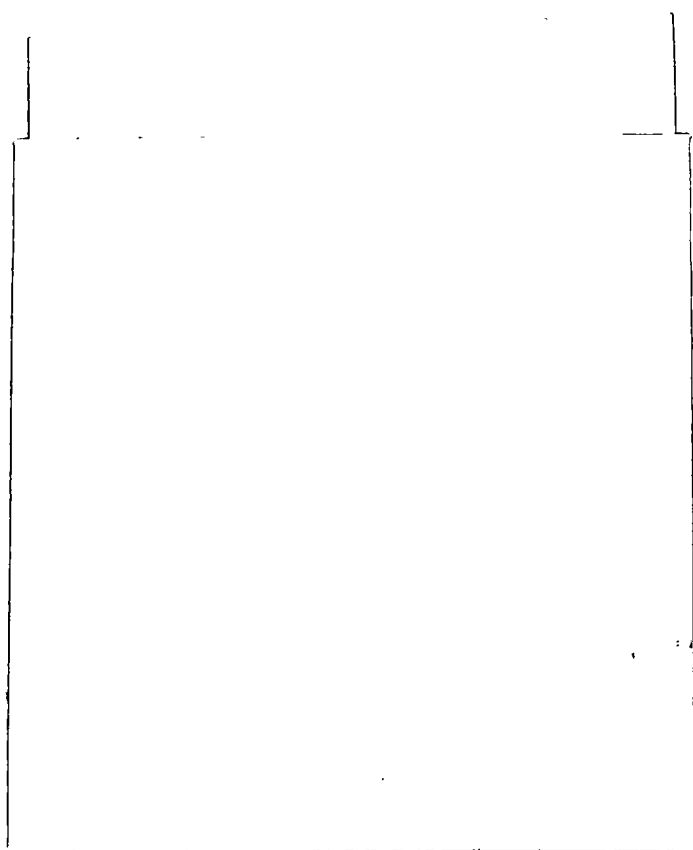
EMBARKATION AND LOADING—AMPHIBIOUS

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HEADQUARTERS, DEPARTMENT OF THE ARMY

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FIELD MANUAL

No. 60-30

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D.C., 10 May 1962

EMBARKATION AND LOADING—AMPHIBIOUS

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✓ * This manual supersedes FM 60-30, 6 September 1952.

SECTION I

GENERAL

1. Purpose and Scope

a. The purpose of this manual is to provide a guide for planning and executing embarkation of Army forces in an amphibious operation.

b. This manual is an extension of basic guidance on embarkation of Army forces as stated in FM 31-12. Detailed guidance for planning and executing embarkation at division level and below is provided.

c. Users of this manual are encouraged to submit recommended changes or comments to improve the manual. Comments should be keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments should be forwarded direct to the Commandant, U.S. Army Transportation School, Fort Eustis, Va.

2. Amphibious Operations

a. The characteristics, types, and purposes of amphibious operations are discussed in FM 31-12.

b. The amphibious attack, which is the principal type of amphibious operation, follows a well-defined pattern. The successive events, often called phases, include planning, embarkation, rehearsal, movement, and assault (FM 31-12).

c. The embarkation phase of the operation is the period during which forces move to embarkation areas and embark in assigned shipping. Marshaling of forces and materiel in preparation for final movement to embarkation areas is not part of the amphibious operation. The plans for marshaling and embarkation must be closely coordinated to assure proper readiness and timing in the execution of embarkation.

d. All embarkation plans and preparations are basically designed to permit unloading in the objective area in the order and at the rate required to support the tactical plan.

3. Sea Echelon Concept

a. The sea echelon concept is a plan to implement dispersal and reduce mine countermeasures. The decision for employment of a sea echelon is the responsibility of the amphibious task force commander. When the sea echelon is employed, it includes the following areas:

- (1) *Transport area.* The transport area is an area assigned to a transport organization for debarking troops and equipment. It consists of mineswept lanes, areas, and channels leading from a sea echelon area ((2) below) to the beaches. The maximum number of ships in the transport area is directly limited by dispersion requirements, availability of forces for mine countermeasures, and local hydrography and topography. Landing ship areas, helicopter transport areas, control ship stations, and fire support areas are dispersed within this swept area (FM 31-12).
- (2) *Sea echelon area.* The sea echelon area is an area to seaward of a transport area from which assault shipping is phased into the transport area and to which assault shipping withdraws from the transport area. Determination of the size and location of the sea echelon area for a particular operation is based on dispersion, as a defense against special weapons attack; antisubmarine protection; mine countermeasure effort.

b. Employment of a sea echelon introduces an additional factor that requires careful development in embarkation planning. The sea echelon provides for phasing amphibious ships into the transport area in the numbers and in the sequence required to support the landing plan. If troops, supplies, and equipment are not correctly assigned to ships and if ships are not properly phased into the transport area, disruption in the planned sequence of landing troop units, inadequate logistic support, and unacceptable concentration of shipping may result.

4. Amphibious Ships

a. Landing force embarkation officers must have a general knowledge of the most common types of amphibious ships assigned to transport groups of an amphibious task force. This knowledge will facilitate their liaison activities with Navy personnel, who will usually refer to these ships by their abbreviated titles. Common types of amphibious ships with their abbreviated titles are listed below:

Amphibious Force Flagship -----	AGC
Attack Transport -----	APA
High Speed Transport -----	APD
Attack Cargo Ship -----	AKA
Amphibious Assault Ship -----	LPH
Amphibious Transport, Dock -----	LPD
Landing Ship, Dock -----	LSD
Landing Ship, Tank -----	LST
Landing craft, utility (not an amphibious ship, but used extensively in amphibious operations) -----	LCU

b. The amphibious ships listed above are illustrated in appendix VII.

SECTION II

ORGANIZATION FOR EMBARKATION

5. Landing Force Organization for Embarkation (fig. 1)

a. Composition. The organization for embarkation is designed to simplify embarkation and generally follows the pattern of the tactical organization. The landing force is formed into embarkation teams, elements, units, and groups.

(1) *Embarkation team.*

- (a) The embarkation team is the basic troop organization for embarkation. An embarkation team consists of troops, equipment, and/or supplies embarked in a single ship. For example, 1,500 troops in an Attack Transport (APA), or 2,000 tons of troop equipment and supplies and 100 troops in an Attack Cargo Ship (AKA), or 40 troops in a High Speed Transport (APD), each constitutes an embarkation team.
- (b) The embarkation team commander is designated in the embarkation order (app. II) prepared by the embarkation unit. The team embarkation officer may be designated in the same order or by the embarkation team commander. The embarkation team commander may be designated commanding officer of troops by a separate directive.

(2) *Embarkation element.*

- (a) The embarkation element consists of two or more embarkation teams grouped to conform to the organization for landing. It is formed when organizational integrity is essential to the performance of an assigned mission or when the situation requires additional echelons for control in planning and execution of embarkation. The embarkation unit will normally prepare plans and supervise the execution of embarkation for the embarkation element. The embarkation element commander exercises command supervision in the preparation of team embarkation plans and assists the embarkation unit commander in the embarkation of the embarkation element. The embarkation element

does not normally prepare an embarkation plan unless the element is assigned numerous ships or the mission assigned to the tactical organization around which the element is formed lends itself to separate documentation. A battalion embarking in more than one ship is a typical embarkation element. In this case the battalion commander is the embarkation element commander; he might also be an embarkation team commander. Embarkation elements can be formed from attached support units and are not limited to embarkation teams organized from assault troops.

- (b) The embarkation element commander is designated in the embarkation order prepared by the embarkation unit. The element embarkation officer may be designated in the same order or by the embarkation element commander. The parallel Navy command to an embarkation element is the transport element or the landing ship element. Each of the embarkation teams comprising an embarkation element is embarked on a single ship of the corresponding transport or landing ship element.

(3) *Embarkation unit.*

- (a) The embarkation unit consists of two or more embarkation teams or two or more embarkation elements or a combination of embarkation teams and elements. The brigade landing team (BdeLT) forms a typical embarkation unit. Embarkation units may be formed from attached support units and are not limited to embarkation teams or elements organized from assault troops.
- (b) The embarkation unit is the echelon where direct control and coordination of activities of both embarkation elements and teams are exercised. The embarkation unit is assigned shipping by the embarkation group and, in turn, assigns ships to embarkation elements and teams.
- (c) The number of embarkation units formed when an infantry division embarks for an amphibious operation will vary with the mission assigned and the composition of the units attached to the division to accomplish its mission. It may be necessary to form embarkation units composed chiefly of the following:
 - 1. Units embarking in Amphibious Assault Ships (LPH) or High Speed Transports (APD).
 - 2. Units which are part of the advance force.

3. Units which are embarked at a considerable distance from the remainder of the division, such as landing force helicopter and landing craft units.

(d) The embarkation unit commander is designated in the embarkation order of the embarkation group (division). The unit embarkation officer may be designated in the same order or by the embarkation unit commander. The parallel Navy command to an embarkation unit is the transport unit or the landing ship unit. The embarkation teams and/or elements of an embarkation unit are embarked in the ships of one transport or landing ship unit.

(4) *Embarkation group.*

(a) The embarkation group is the organization for embarkation of a division.

(b) The division commander in the organization for embarkation becomes the embarkation group commander. The group embarkation officer is normally designated by the embarkation group commander and becomes a special staff officer of the division staff.

(c) The parallel Navy command to an embarkation group is the transport group.

b. *Organization of Reinforcements (Division Level).* When army, corps, and service troops are attached to an infantry division, the division commander may form them into separate embarkation units, or he may distribute them among other embarkation units as best suits his requirements. When army, corps, and service troops are assigned to a separate embarkation group, planning considerations and procedures closely parallel those of the division.

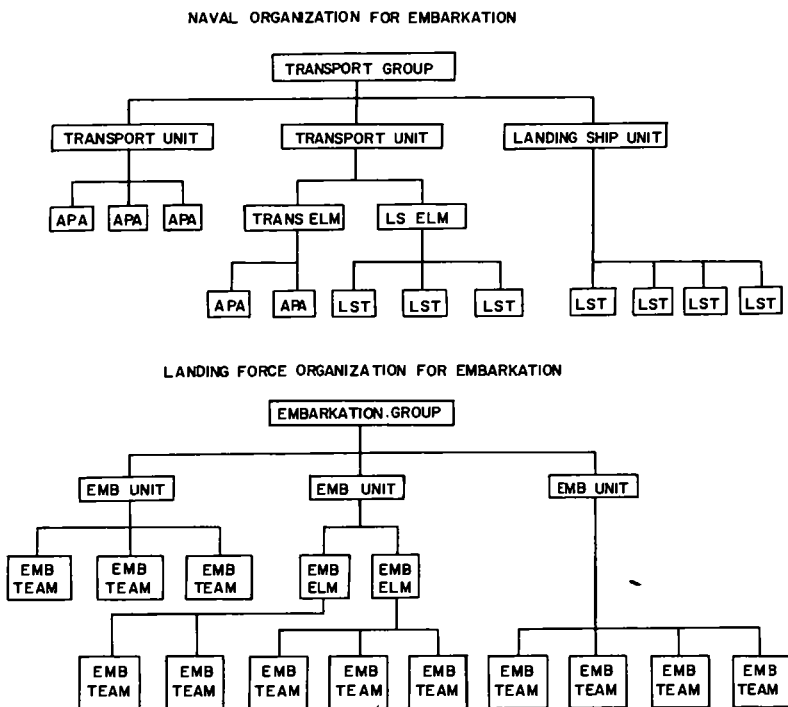
c. *Designations of Embarkation Organizations.*

(1) Embarkation organizations are designated by Roman numerals, phonetic combinations of letters, and Arabic numbers. Roman numerals are used to designate embarkation groups; phonetic combinations of letters, embarkation units; and Arabic numbers, embarkation teams within embarkation units. Thus the designation IV Bravo 4 designates Embarkation Group IV, Embarkation Unit Bravo, Embarkation Team 4.

(2) When an embarkation element is formed, it is designated by phonetic combinations of letters, which are in addition to those designating the embarkation unit. For example, if Embarkation Team 4 is part of the first embarkation element formed in Embarkation Unit Bravo,

its designation would be IV Bravo, Alpha 4. Other embarkation elements in the same embarkation unit would be designated Bravo, Charlie, etc., in the order of formation. In the preparation of an embarkation element loading plan, the forms and cover sheet must indicate that the organization documented is an embarkation element.

- (3) When supplies and equipment are being moved to the embarkation area, the embarkation organization designation may be used as a shipment number, provided the embarkation organization has been established before shipment of supplies.



THE TERMS USED TO IDENTIFY THE ECHELONS IN THE TROOP ORGANIZATION FOR EMBARKATION ARE GROUP, UNIT, ELEMENT, AND TEAM.

A. EMBARKATION GROUP. THE ORGANIZATION FOR THE EMBARKATION OF A DIVISION.

B. EMBARKATION UNIT. THE EMBARKATION ECHELON BELOW EMBARKATION GROUP. THE ORGANIZATION NORMALLY FORMED BY A BRIGADE.

C. EMBARKATION ELEMENT. THE EMBARKATION ECHELON BELOW EMBARKATION UNIT. THE ORGANIZATION NORMALLY FORMED BY A BATTALION.

D. EMBARKATION TEAM. THE PERSONNEL, SUPPLIES, AND EQUIPMENT EMBARKED ON A SINGLE SHIP.

Figure 1. Naval and landing force organization for embarkation.

6. Navy Amphibious Force Organization

The term *amphibious force* in naval usage is the administrative title of the amphibious-type command of a fleet. The amphibious force in the U.S. Navy is a permanent administrative organization established for the purpose of planning, training, and preparing for amphibious operations. During preliminary planning for an amphibious operation, Navy representatives may be identified as members of organizations within the amphibious force pending determination of the naval task organization for the operation.

a. In the administrative organization, the amphibious group (Phib Gp) is similar to an Army corps headquarters. It is composed of a staff, certain headquarters troops, and a command ship, but without operating forces.

b. The amphibious squadron (Phib Ron) is an administrative and an operational unit. An amphibious squadron includes APA's, AKA's, LSD's, and LST's. It may include an LPH. When participating in an amphibious operation, the amphibious squadron may be referred to as a transport group.

7. Navy Organization for Embarkation

(fig. 1)

Naval units are formed into task groups to execute and/or support an amphibious operation. The task groups form the naval component of the amphibious task force. Two or more task groups may be combined to simplify administration and control. Task groups are designated by function; for example, transport group, control group, tactical air control group, etc. (FM 31-12). Embarkation staffs of the landing force component coordinate the planning and execution of embarkation with transport groups. The transport group is a tactical grouping of all ships assigned to transport an embarkation group. The organization of a transport group is tailored to the embarkation organization and includes—

a. *Transport Unit.* A tactical grouping of all ships assigned to transport an embarkation unit. The grouping is referred to as a landing ship unit if all ships are landing ships.

b. *Transport Element.* A tactical grouping of all ships assigned to transport an embarkation element. The grouping is referred to as a landing ship element if all ships are landing ships.

c. *Transport.* An individual ship assigned to transport an embarkation team.

8. Shipboard Organization

(fig. 2)

a. Amphibious ships are organized into functional departments with an officer detailed as department head for each. Department heads operate directly under the executive officer and the commanding officer. The titles of department heads usually indicate their duties; for example, navigator, engineer officer.

b. Departments are divided into divisions, and each division is responsible for a particular phase of the ship's activities. The officer in charge of each division is called the division officer.

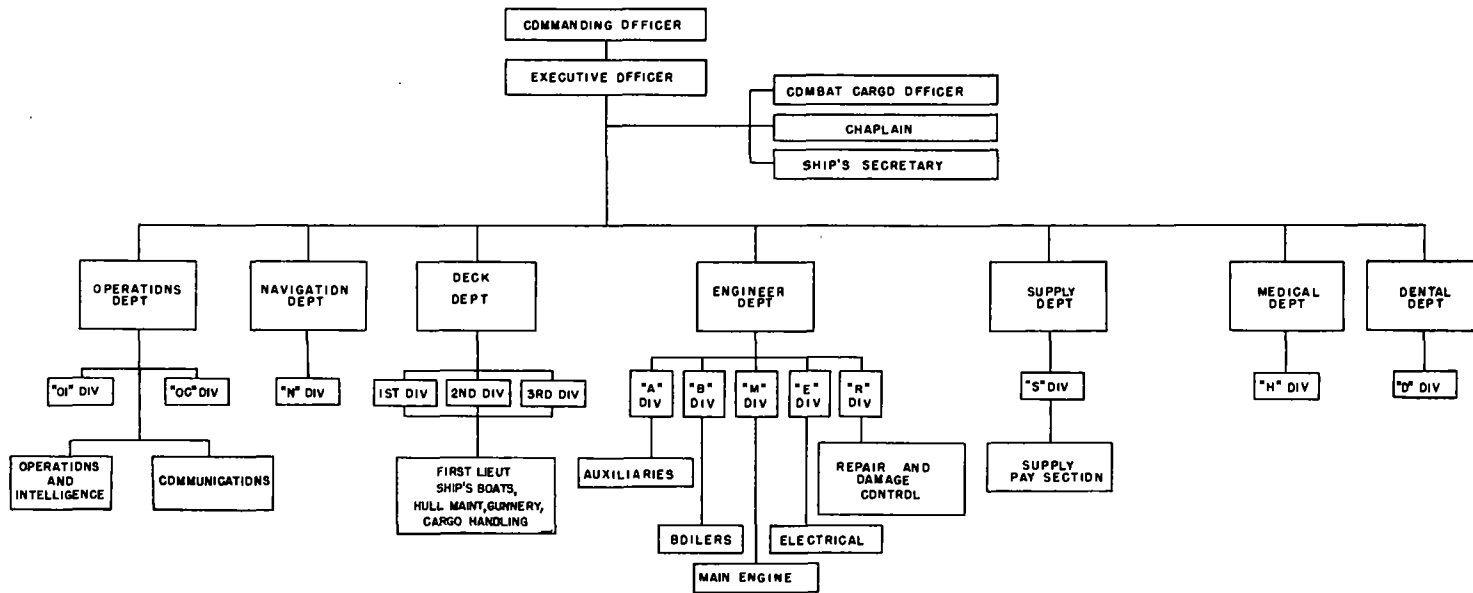


Figure 2. Typical ship organization, amphibious ship.

SECTION III

EMBARKATION RESPONSIBILITIES

9. General

a. The amphibious task force commander is responsible for embarking the landing force. He exercises operational control over commanders of the amphibious task force component forces during embarkation. The commander of the naval component is responsible for furnishing the required shipping, necessary gear operators on board ship, and technical advice on loading. The landing force commander is responsible for furnishing the personnel to handle the cargo, both on shore and on board ship, if required. The mounting agency commander is responsible for support of the embarkation as directed. See paragraph 16.

b. For effective conduct of embarkation, liaison must be established and maintained at corresponding command levels of the landing force, the naval force, and the mounting agency. Responsibility must be decentralized to levels of execution. A system for control of embarkation must be set up. During loading, the embarkation organization commander at each level establishes a control office in the embarkation area, which is used in common by the control agencies of the landing force embarkation organization and the corresponding naval (transport) organization. From the control offices, liaison is maintained with the external agencies assigned to support the embarkation.

c. The assembly of supplies, equipment, shipping, and other forces for embarkation begins sufficiently in advance of embarkation to permit adequate checking of schedules and to insure that schedules will be met in an orderly manner. Embarkation is accomplished at several points to avoid confusion, overloading of supporting agencies, and concentrations of forces and materiel vulnerable to attack.

10. Amphibious Task Force Commander

The amphibious task force commander is responsible for the following:

a. Overall coordination and control and general supervision of the execution of embarkation in accordance with the embarkation schedule and loading plans.

b. Movement of assault shipping to embarkation points in accordance with the embarkation schedule.

c. Coordination with external agencies for control of the embarkation and movements to embarkation points.

d. Provision of communication facilities afloat, including adequate security measures.

11. Landing Force Commander

The landing force commander is responsible for the following:

a. Preparation of the landing force for embarkation.

b. Making requirements known for loading assistance to be provided by naval forces.

c. Movement of embarkation organization components to and within the embarkation area.

d. Assembly of cargo and personnel on shore in accordance with the embarkation schedule and loading plans.

e. Security of the embarkation areas or coordination of security measures with external agencies as prescribed by higher authority.

f. Supervision of troop activities during embarkation.

g. Provision for communications ashore in the embarkation area, including adequate communications security measures. To preclude significant commitment of organic communications equipment of the landing force that is to be embarked, additional equipment should be provided for use in the embarkation area. If possible, arrangements should be made with the commander of the area in which the embarkation is to take place to provide shore communications facilities for that area.

12. Embarkation Staff Officers

Embarkation staff officers are responsible for discharging the responsibilities of their commanders. The responsibilities of the landing force commander are passed to the embarkation staff at group, unit, element, and team levels. The duties of the various members of the embarkation staff are discussed in detail in section IV.

13. Embarkation Team Commander

The embarkation team commander is responsible for the following:

a. Insuring that personnel, equipment, and cargo for his assigned ship are ready for embarkation in accordance with loading plans. This includes preparation of equipment and supplies, such

as filling fuel tanks, loading basic ammunition loads in trucks and tanks, waterproofing vehicles, marking supplies and equipment, crating, and packaging.

b. Providing for his assigned ship an advance party to arrive at the embarkation point before loading begins.

c. Organizing and operating an embarkation team control office at the embarkation point.

d. Providing shoring and dunnage material.

e. Providing slings and lashing gear required in excess of that authorized and/or available on his ship.

f. Insuring that dock or beach working parties are available for use in the loading area.

14. Commanding Officers of Individual Ships

a. The ship's commanding officer carries the full responsibility for the operation, tactical employment, and safety of his ship in addition to the responsibility for the delivery of the embarkation team at a given point at a specified time. He has full authority to discharge these responsibilities. Orders from him to troop units embarked on his ship are relayed to the troops through the commanding officer of troops, who assures that all orders from the ship's commanding officer or from personnel representing him are carried out.

b. During embarkation, commanding officers of individual ships are responsible for—

- (1) Having all troop spaces cleared and available for use in accordance with the ship's loading characteristics pamphlet (app. III).
- (2) Handling, securing, and stowing cargo in accordance with the approved loading plans. The commanding officer's responsibility commences with the actual lifting or transportation of cargo by personnel under his control. When cargo is transported, lifted, or loaded by personnel not under his control, the commanding officer's responsibility begins when the cargo is safely stowed on board and accepted by him.
- (3) Providing or obtaining winchmen, hatch tenders, hatch officers, and all other personnel for handling cargo on the ship, except the ship's platoon, which is provided by the landing force.
- (4) Providing assault craft.
- (5) Providing cargo-handling gear and lashing gear, including slings, lowering lines, and guide (tag) lines, as prescribed by ship's allowance.

- (6) Billeting and messing personnel of the advance party who embark in his ship.

15. Commanding Officer of Troops

Since troops of several different organizations may be embarked on the same ship, it is necessary for administrative convenience to designate a single commander for all embarked troops. Accordingly, a commanding officer of troops for each ship is designated during the planning phase by the next senior troop commander. Usually the senior troop commander of the organizations embarked on the ship is designated. In many instances, he is the same officer designated in the organization for embarkation as the embarkation team commander. The commanding officer of troops is responsible for administration, discipline, and training of all embarked troops. He is also responsible for the preparation of debarkation documents used in the ship-to-shore movement (FM 31-12).

16. External Agencies

External agencies as referred to in this manual are U.S. service installations or commands within which the mounting area is located. In the continental United States, the external agency could be an army area; in oversea areas, a communications zone. External agency commanders may be given the following responsibilities by higher authority:

- a. Specifying and making available required staging areas, embarkation areas, and embarkation points and developing and operating facilities therein.
- b. Providing authorized supplies and services to an amphibious task force, including supplies to be loaded at each embarkation area and necessary communications facilities for use during embarkation.
- c. Coordinating and controlling administrative movements within the embarkation area.
- d. Providing security for the embarkation area.
- e. Providing loading equipment, technical assistance, dunnage, and other aids required in the embarkation area.

17. Common Responsibilities

Staff officers of the U.S. forces responsible for planning an amphibious operation must maintain constant liaison to coordinate all plans so that the completed plan supports the tactical and logistical requirements. Throughout the preparation and planning for an amphibious operation, careful consideration must be

given in the tactical and logistical plans to balance requirements against the availability of means. There are usually limiting factors which govern all aspects of the operation, and there are usually competing requirements for some means. This situation requires that plans be tested continually during the planning phase to determine limiting factors. There is no established feasibility test for an amphibious operation. Each situation is critically examined to determine aspects which may warrant testing, and appropriate feasibility tests are conducted. The principal factors which affect embarkation and require careful study are as follows:

a. Availability of shipping versus lift requirements for the operation.

b. Unloading capability in the objective area versus desired rate of buildup ashore.

c. Availability of time versus requirements for detailed and thorough coordination and planning.

d. Availability of ship-to-shore means versus requirements for assault craft in the ship-to-shore movement.

e. Desired rate of combat force buildup versus base development requirements during the assault phase.

f. Requirements for special equipment versus availability.

g. Conflicts between time requirements and variable weather and climatic conditions.

SECTION IV

EMBARKATION AND COMBAT CARGO OFFICERS

18. General

Officers specially trained in planning and supervising embarkation for an amphibious operation are assigned to landing force organizations, to major amphibious ships, and to naval staffs involved in an amphibious operation. In the landing force organization, these officers are designated embarkation officers. Troop commanders designate embarkation officers from embarkation team to embarkation group level. In the naval organization these officers are members of the permanent staff and are designated ship (or staff) combat cargo officers. Embarkation officers and combat cargo officers advise and assist their respective commanders in planning the embarkation and supervising its execution. The embarkation officer and combat cargo officer of corresponding landing force and naval organizations maintain constant liaison during planning and execution of embarkation. The corresponding landing force embarkation officers and naval combat cargo officers are indicated below:

<i>Landing force</i>	<i>Naval</i>
Landing force embarkation officer-----	Amphibious task force combat cargo officer.
Group embarkation officer-----	Transport group combat cargo officer.
Unit (or element) embarkation officer..	Transport unit (or element) combat cargo officer.
Team embarkation officer-----	Ship combat cargo officer.

19. Relationship of Embarkation Officers to the Tactical-Logistical Group

In the preparation of embarkation plans, embarkation officers at team, unit, and group level become intimately acquainted with the composition of the landing force and the plan for tactical employment of their portions of the force. For this reason, officers who serve as embarkation officers are normally assigned to the tactical-logistical (Tac-Log) groups of their respective organizations for the ship-to-shore movement. Officer personnel selected for embarkation duties should not be commanders of assault troop units. In this connection, team, unit, and group embarkation officers must not be confused with embarkation team, unit, and

group commanders. Detailed information concerning organization and operation of the Tac-Log group is contained in FM 31-12.

20. Landing Force Embarkation Officer

The landing force embarkation officer performs the following duties:

a. Heads the embarkation section of the special staff of the landing force commander.

b. Determines the landing force shipping requirements for submission to the amphibious task force commander.

c. Recommends allocation of assigned shipping.

d. Prepares and forwards requests for additional shipping, if required.

e. Coordinates and prepares the schedule of assault and followup shipping to meet the landing force tactical and logistical requirements.

f. Coordinates all embarkation activities of the landing force.

g. Maintains a complete and current file of the ship's loading characteristics pamphlets for amphibious ships and Military Sea Transportation Service (MSTS) ships.

h. During debarkation, functions as a member of the Tac-Log group on the central control ship.

21. Group Embarkation Officer

The group embarkation officer performs the following duties:

a. Heads the embarkation staff of the embarkation group.

b. Supervises training of embarkation officers within the embarkation group.

c. Maintains current tonnage tables of equipment and supplies.

d. Maintains a complete and current file of ship's loading characteristics pamphlets for amphibious ships and MSTS ships.

e. Advises subordinate embarkation officers on preparation of loading plans.

f. Maintains current list of ships, containing names and/or number and types of specific ships assigned to his group.

g. Recommends allocation of assigned shipping.

h. Determines and informs subordinate commands of the time, date, and location that ships will be available for loading.

i. Assigns mounting areas and embarkation points to subordinate embarkation organizations.

j. Surveys the embarkation area and obtains data on the number of ships which can be loaded simultaneously.

k. Maintains constant liaison with external organizations responsible for supporting the embarkation.

l. Coordinates and supervises all loading activities within the embarkation group.

m. During debarkation, functions as a member of the Tac-Log group on the assistant central control ship or other designated control ship.

22. Unit and Element Embarkation Officers

The duties of the unit embarkation officer and the element embarkation officer are the same, except that an embarkation plan is seldom prepared by the embarkation element. However, the embarkation element may prepare an embarkation plan when the element consists of a number of ships or when the mission of the organization around which the element is formed lends itself to separate documentation. The embarkation element is always subordinate to the embarkation unit. Normally the embarkation unit prepares the embarkation plan for the embarkation element and includes it in the unit embarkation plan. The embarkation element commander is operation supervisor for the unit embarkation officer. The duties of the unit embarkation officer are as follows:

a. Heads embarkation section on the special staff of the embarkation unit commander.

b. Recommends allocation of assigned shipping.

c. Advises subordinate embarkation officers in the preparation of loading plans.

d. Coordinates all loading activities with embarkation officers of higher and subordinate echelons.

e. During debarkation, functions as a member of the Tac-Log group on the primary control ship or other designated control ship, depending on the landing means (surface or air) employed for the ship-to-shore movement.

23. Team Embarkation Officer

a. The team embarkation officer is a commissioned officer detailed from the major unit within the embarkation team. He represents the embarkation team commander in all matters pertaining to embarkation and provides liaison between the commanding officer of the ship and the embarkation team commander.

b. During embarkation planning, the team embarkation officer performs the following duties:

- (1) Obtains a loading characteristics pamphlet for his assigned ship from the unit embarkation officer and verifies

the accuracy of the contents of the pamphlet with the ship combat cargo officer.

- (2) Coordinates the preparation (clearing and construction) of the embarkation point, cargo assembly areas, and vehicle staging areas with the responsible agencies.
- (3) Studies and becomes familiar with the landing force embarkation plan, the tactical plan, and all pertinent standing operating procedures.
- (4) Supervises the preparation of loading forms (sec. VI) by all units in the embarkation team, completes and consolidates these forms, and submits the consolidated forms as the completed loading plan to the embarkation team commander and the commanding officer of the ship for approval.
- (5) Supervises and coordinates the preparation of equipment and supplies for loading in accordance with the loading plan and the embarkation plan or order.
- (6) Coordinates and assists in scheduling the movement of equipment and supplies to the embarkation point.
- (7) Plans and supervises stowage of equipment and supplies in the embarkation area to facilitate rapid loading of his ship.
- (8) Plans and coordinates with the combat cargo officer stowage of initial combat equipment and special stowage required for equipment and supplies to be stocked in floating dumps.
- (9) Estimates requirements and provides for adequate and suitable mechanical loading devices at the embarkation area.
- (10) In coordination with the embarkation team commander, plans for the security and protection of equipment and supplies at the embarkation point.
- (11) Insures that supervisory personnel assigned to assist him are familiar with the ship's loading characteristics pamphlet, the embarkation point stowage plan, and the loading plan.
- (12) Plans and coordinates the embarkation of the advance party. The advance party should arrive aboard ship at least 24 hours before the main party.
- (13) Prepares and submits periodic embarkation progress reports during planning to the embarkation team commander and the group embarkation officer.
- (14) Advises the appropriate signal officer of communications

equipment and personnel requirements within the embarkation area to support operations.

- (15) Arranges for lighting equipment and provides adequate lighting in the embarkation area if there is to be night loading.
- (16) Insures that all equipment and supplies are marked in accordance with the embarkation plan or order.
- (17) Ascertains that the labor required for lashing, shoring, and chocking has been provided by the embarking troop units or has been arranged for.
- (18) Arranges with the appropriate supporting agency for delivery of lashing, shoring, and chocking materials to the embarkation area.

c. During embarkation and rehearsal, the team embarkation officer performs the following duties:

- (1) Supervises loading to insure that it is proceeding in accordance with the approved loading plan. Constant coordination with the combat cargo officer during loading is mandatory for efficient operation.
- (2) Insures that any change in the loading plan is coordinated with the combat cargo officer and approved by the embarkation team commander and the commanding officer of the ship. Maintains a record of all approved changes to the loading and unloading plan.
- (3) Insures that a hatch list and a time study are maintained by each hatch section.
- (4) Insures that shoring, chocking, and lashing of equipment are performed in accordance with the requirements of the combat cargo officer and/or the commanding officer of the ship.
- (5) Distributes the final loading plan in accordance with distribution lists.
- (6) During rehearsal, makes spot corrections in the unloading plan and communications system.

d. During movement to objective, the team embarkation officer performs the following duties:

- (1) Refines the final loading plan, incorporating changes occurring during movement when cargo and/or personnel are transferred to or from his ship. If the loading plan is published en route, or if changes are made in the plan published prior to embarkation, he distributes the final loading plan upon arrival in the objective area.

- (2) Instructs and orients all personnel concerned with unloading in their duties and in lessons learned during rehearsal.
- (3) Makes rations and ammunition available for distribution to troops on D—1.
- (4) On D—1, insures by inspection that all vehicles are in running condition, that the combat load is secure, and that vehicle waterproofing is in good condition.
- (5) Insures that personnel concerned with unloading are available for duty and at their duty stations when unloading begins.

e. During the assault phase, the team embarkation officer functions as the debarkation officer and performs the following duties:

- (1) Assists the ship combat cargo officer in offloading personnel and cargo.
- (2) Advises the troop commanding officer and/or the Tac-Log group representative of the status of unloading operations and estimated time of completion, as required.
- (3) Assists the ship combat cargo officer in locating and unloading cargo requested on a priority basis.
- (4) At the completion of unloading, insures by personal inspection that cargo and troop compartments are clear of all troops, equipment, and supplies.
- (5) Reports to his superior in the organization for embarkation when his ship has completed discharge. Insures that landing force personnel employed to discharge the ship are returned to their parent organizations.

24. Staff Combat Cargo Officers for Naval Forces

a. *Transport Element Combat Cargo Officer.* When the size, composition, or mission of an embarkation organization creates a requirement for a staff combat cargo officer at this echelon, his duties parallel those of a transport unit combat cargo officer (b below).

b. *Transport Unit Combat Cargo Officer.* A transport unit combat cargo officer is assigned to the staff of each transport unit commander. His principal duties are as follows:

- (1) Assists and advises the transport unit commander in all matters concerning troop embarkation, cargo stowage, and unloading.
- (2) Acts as liaison officer between the transport unit commander and the embarkation unit commander.
- (3) Coordinates the activities of ship combat cargo officers.

- (4) Maintains statistical records of ship cargo-handling characteristics and performance so that he can intelligently advise or recommend the allocation of shipping for embarkation of troops and loading of cargo.
- (5) Assembles the loading and stowage plans of the ships of the transport unit.
- (6) Maintains up-to-date records of the progress of loading, embarkation, and unloading, and compiles such reports as may be periodically required by higher authority.
- (7) Maintains a file of ships' loading characteristics pamphlets of all vessels composing the transport group in order that he may advise on the capabilities of these ships if and when they are assigned to his transport unit.

c. Transport Group Combat Cargo Officer. The transport group combat cargo officer performs the following duties:

- (1) Advises and assists the transport group commander in matters concerning allocation of shipping, troop embarkation, cargo stowage, and unloading.
- (2) Acts as liaison officer between the transport group commander and the embarkation group commander.
- (3) Maintains a complete file of characteristics of amphibious ships. This file should contain cargo handling and stowage characteristics and performance records.
- (4) Coordinates activities of subordinate combat cargo officers.
- (5) Collects and assembles the loading plans of the ships assigned to the transport group.
- (6) Maintains current records of the status and progress of loading and unloading during embarkation and debarkation phases. Compiles periodic status reports when required by higher headquarters.

d. Amphibious Task Force Combat Cargo Officer.

- (1) The duties of the amphibious task force combat cargo officer are similar to those of the transport group combat cargo officer, including supervision, allocation, and loading of assault shipping.
- (2) The amphibious task force combat cargo officer must have complete knowledge of the composition and schedules of followup shipping. He must have detailed information of the types of cargo loaded in followup ships, unloading plans, and unloading capabilities in the objective area.

25. Ship Combat Cargo Officer

a. The ship combat cargo officer is the member of the ship's complement corresponding to the team embarkation officer. When available, a Marine Corps officer highly trained in ship loading will be assigned to large transports such as APA or AKA as combat cargo officer.

b. The principal duties of the ship combat cargo officer are to advise and assist the commanding officer of the ship and the embarkation team commander in all matters relating to loading and unloading troop cargo and to embarking, billeting, messing, and debarking troops. The team embarkation officer, in coordination with the ship combat cargo officer, prepares the loading plan and the unloading plan to support the landing plan.

26. Essential Knowledge

a. In addition to being able to perform their respective duties as listed in paragraphs 18 through 25, embarkation officers and combat cargo officers should have a sound knowledge of the following:

- (1) Naval customs and terminology.
- (2) Standard ship organization.
- (3) Tables of organization and equipment and tables of allowances for landing force units.
- (4) The naval amphibious force (administrative) organization and naval task force (operational).
- (5) The landing force organization.
- (6) Classification of supplies and equipment.
- (7) Standing operating procedures for the preparation of supplies and equipment for loading, including waterproofing, packing, marking, and crating.
- (8) Characteristics of amphibious ships, landing craft, amphibious vehicles, and helicopters.
- (9) Ship's loading characteristics pamphlet.
- (10) Characteristics of nuclear weapons for loading purposes, including packaging, handling, stowage, and security requirements.
- (11) Loading and unloading time factors.

b. In addition, embarkation and combat cargo officers assigned to embarkation organizations that employ helicopters for the movement of personnel and/or supplies from ship to shore must be trained in procedures for embarking personnel on helicopters, preparation of unitized cargo loads, and helicopter loading.

SECTION V

EMBARKATION PLANNING

27. General

a. Embarkation planning involves the measures necessary to assure timely and effective outloading of the amphibious task force. It ranges from determination of overall shipping requirements and embarkation schedules at high levels to preparation of detailed loading plans for individual ships. Embarkation planning must proceed concurrently with all other planning. It requires constant coordination between all landing force and Navy command levels. In the final analysis the embarkation plan must support the tactical plan for landing and the scheme of maneuver ashore.

b. Embarkation planning requires detailed knowledge of the characteristics, capabilities, and limitations of ships and their relationship to the troops, supplies, and equipment to be embarked. The planner must be familiar with transport-type amphibious ships, Military Sea Transportation Service ships, and merchant ships. The two latter categories present special problems because they are not designed, equipped, or crewed primarily for amphibious operations. Their use must be anticipated, and the additional requirements for hatch crews, winchmen, cargo-handling equipment, cargo nets, assault craft, and other facilities must be considered. For general data pertaining to merchant ship types, see appendix V.

c. For a discussion of the basic decisions required before detailed planning for an amphibious operation can be initiated, see FM 31-12.

28. Embarkation Planning Considerations

a. Amphibious operations are complicated by the need to coordinate in detail the actions of all forces involved, the complexity of logistic support activities, the need for effective command relationships, and the requirements of other operational factors peculiar to the operation.

b. In planning for embarkation, consideration must be given to the following:

- (1) The organization for embarkation of the landing force

must be compatible with the plan for the ship-to-shore movement, which, in turn, must support the scheme of maneuver ashore.

- (2) The requirement for maintaining the tactical integrity of landing force units participating in and/or supporting the assault must be balanced against the requirement for loading assault units in assigned shipping in a manner that will minimize the effects attending the loss of one ship.
- (3) The number of ships in the objective area, at one time, should be the minimum which will meet requirements. The units of the landing force not required initially in the assault, or whose employment is deferred, are loaded and dispatched so that their arrival in the objective area is scheduled to coincide with their contemplated employment. Careful planning by all echelons, both landing force and Navy, is necessary to accomplish this objective. In addition, the manner in which ships are loaded frequently determines the number required at the objective at one time and the speed with which they are unloaded.
- (4) Landing force commanders and their staffs at the several levels of command are embarked in the same ships as the corresponding naval commanders.
- (5) Embarkation areas and points must be selected. Generally, the selection of embarkation areas and points is influenced by time available for loading, available space, piers, beach loading areas, and other usable facilities. Consideration must be given to:
 - (a) Availability of suitable storage facilities.
 - (b) Adequacy of road nets and space available for processing supplies and equipment brought into the marshaling or staging areas.
 - (c) Availability of harbor services.
 - (d) Availability of a suitable, protected anchorage or roadstead.
 - (e) Suitability of beaches for the beaching of landing craft and ships and for amphibious vehicles to enter and leave the water.
- (6) The location of marshaling areas in relation to embarkation areas may require provisions for intermediate troop staging areas to assure final movement to the embarkation areas without interruption. This may require the maintenance of a staging and embarkation organization

beyond the time the principal elements of the force sail in order to accommodate landing force echelons which are to proceed to the objective area in later increments. Embarkation organizations should be formed in marshaling areas so that a final check on the preparation for embarkation may be made and deficiencies corrected.

- (7) Ship's loading characteristics pamphlets must be furnished to the landing force. They are provided by the Navy for each amphibious-type ship. The pamphlet contains all ship's data that are required by the landing force for embarkation. The diagrams and capacity totals in the pamphlet show the accommodations and cargo spaces for each ship (app. III).

29. Sequence of Embarkation Planning

Following receipt of the initiating directive for an amphibious operation, embarkation planning commences at all echelons and proceeds concurrently. The major steps overlap, but they are usually accomplished in the following general sequence:

- a. Establishment of liaison between corresponding naval and landing force levels of command.
- b. Provision by the amphibious task force commander of planning data concerning the personnel and materiel of naval and other forces to be embarked with the landing force.
- c. Determination by the landing force commander of his assault and followup shipping requirements and submission of these requirements to the amphibious task force commander.
- d. Allocation of shipping by the amphibious task force commander. If sufficient shipping is not available, consultation is required between interested commanders in order to adjust plans or to determine requirements for additional shipping.
- e. Distribution of ship's loading characteristics pamphlets to the landing force.
- f. Establishment of organizations for embarkation by the amphibious task force and landing force commanders.
- g. Selection and preparation of embarkation areas.
- h. Selection and preparation of marshaling facilities for the landing force.
- i. Determination of control, security, and communication facilities required during embarkation.
- j. Development of plans for assembly of assault shipping and movement of personnel and materiel to embarkation areas.

k. Preparation, review, approval, and promulgation of detailed embarkation and loading plans.

30. Landing Force Shipping Requirements

It is essential that the assault and followup shipping required to mount and support an amphibious operation be determined as early as possible in the planning phase. The landing force commander makes the initial estimate of his shipping requirements. This estimate is based upon information furnished by his staff and the amphibious task force commander. Echelonment of the landing force must be determined as a basis for refinement of the initial estimate of required shipping (FM 31-12) .

a. Shipping for the assault echelon of the landing force is assault shipping under operational control of the amphibious task force commander.

b. Shipping for the followup echelon of the landing force may be either assault shipping or followup shipping.

c. The assault echelon of the landing force must be combat loaded. The number of vehicles rather than personnel is usually the critical factor in determining the requirement for special amphibious ships to lift assault elements of the landing force.

d. Echelonment of reserve supplies must be determined early in planning as a consideration in determining shipping requirements. Assault divisions determine their requirements for assault echelon reserve supplies. The landing force staff determines the requirement for landing force reserve supplies and advises divisions of the amounts of landing force reserves to be loaded in shipping allocated to divisions.

e. Divisions and other major subordinate commands submit their shipping requirements to the landing force commander. The landing force staff determines shipping requirements for the balance of landing force troops and materiel plus any forces and materiel of the Naval and Air Force components for which the landing force has embarkation responsibilities. The landing force staff determines the overall landing force shipping requirements.

31. Determining Landing Force Shipping Requirements

a. Shipping requirements for the landing force are normally developed by:

- (1) Receipt of shipping requirements from the major ground and air echelons of the landing force.
- (2) Determining, at landing force level, shipping requirements for the entire force, to include units not normally

organic to the landing force but to be embarked there-with, and all supplies and equipment to be embarked.

b. Shipping requirements are based on the following:

- (1) Total personnel to be embarked.
- (2) Total supplies and equipment to be loaded, including items requiring special stowage, such as drummed and bulk fuels, HE munitions, and nuclear weapons.
- (3) The scheme of maneuver, task organization for landing, and landing plan, including planned or anticipated nuclear weapons employment by friendly or enemy forces.
- (4) Requirements for special mission or special equipment.

c. To determine shipping requirements, the following actions must be accomplished:

- (1) Determine the task organizations for landing to support the scheme of maneuver ashore.
- (2) Determine the means for landing, that is, landing ships, landing craft, amphibious vehicles, helicopters, or a combination of means.
- (3) Determine the minimum number of means required for landing.
- (4) Determine the type of ships desired to lift the means required.
- (5) Determine the number of ships, by type, required to lift the means.
- (6) Determine the number of ships, by type, required to lift and land the landing force, including lift requirements for troops, supplies, and equipment, and the means for landing.

d. The following is a step-by-step procedure that may be used for determining shipping requirements for all of the components of a landing force:

(1) *Assault elements.*

- (a) Determine the means to be employed for landing (landing ships, landing craft, amphibious vehicles, helicopters, or a combination of means).
- (b) Determine the minimum numbers of landing craft, amphibious vehicles, and helicopters required to support the plan for landing.
- (c) Determine the type of ships desired to lift the means required. For example: APA or AKA for landing craft such as the landing craft vehicle, personnel (LCVP) and landing craft, mechanized (6) (LCM

(6)) ; LSD for larger landing craft such as the landing craft, mechanized (8) (LCM(8)), Landing Craft, Utility (LCU), or amphibious vehicles; LST for amphibious vehicles or for direct beaching; LPD for any landing craft types and helicopters, and LPH for helicopters.

(d) Determine the number of ships, by type, to lift the means required by the assault elements.

(e) Determine the numbers of ships to lift and land the personnel and materiel of the assault elements.

(2) *Combat support and combat service support units.*

(a) Determine the means to be employed, such as LCM, LCU, amphibious vehicles, or beached LST for artillery; LCM(6), LCM(8), LCU, or beached LST for tanks; LCM, LCU, or beached LST for pioneers, shore party, or vehicles.

(b) Determine the number of helicopters, landing craft, and amphibious vehicles required.

(c) Determine the number and type ships required for combat support and service support units.

(3) *Headquarters and reserve units.* Determine the means to be employed for landing, and number and types of ships required, such as amphibious force flagships (AGC) or APA.

(4) *Remaining ship requirements.*

(a) Determine the capacity of ships required in d (1) through (3) above in terms of spaces for personnel, square feet for vehicles, cubic feet for cargo, and cubic feet or gallons for bulk fuel.

(b) Deduct the capacity determined above from the total personnel, square feet of vehicles, cubic feet of cargo, and cubic feet or gallons of bulk fuel to be embarked for the entire landing force.

(c) Determine the number and type of additional ships required to lift the remaining personnel, vehicles, cargo, and bulk fuel of the landing force.

e. After computing total requirements for shipping, plans are examined and corrected, as necessary, to meet the following:

(1) Organization of landing force and naval components must provide for accomplishing assigned missions under preferred and alternate plans.

(2) Landing force troop organizations and materiel must be distributed among embarkation echelons so that the loss

of a single ship will not deprive the remainder of the force of an appreciable amount of any one arm or type of materiel.

32. Allocation of Shipping

a. Allocation of shipping to subordinate units of the landing force should be based upon considerations by which transport requirements were determined (par. 31). Initial allocation may of necessity be by numbers and types of ships only, but specific ship assignments will be made as soon as possible.

b. As planning proceeds, all levels of command keep their superior and subordinate commands informed of progress and changes. Before the embarkation plan is changed, the tactical organization concerned should be consulted for concurrence. Any change in the embarkation plan must be accepted and understood by the appropriate tactical planning section before implementation, and conversely any change in the tactical plan must be reported to the embarkation planning section. A change in the embarkation plan may affect the tactical plan, and most changes in the tactical plan will require a change in the embarkation plan. For example, a decision to land infantry in LVT's will require an increase in the number of landing ships and a corresponding decrease in the number of transports required.

c. Information pertaining to the naval organization for embarkation is made available and communicated to the lower echelons of the landing force organization for embarkation at the earliest possible time so that the lower echelons may begin detailed embarkation planning. The type of information normally furnished to the landing force embarkation organization by the naval transport organization includes the exact composition of the naval transport organization; the date when transport organizations will arrive in the embarkation area; and the date and time when each ship will be available for loading. In addition, the naval transport organization will furnish the embarkation organization with current ships' loading characteristics pamphlets (app. III) for all ships assigned to the transport organization.

d. At the earliest possible date following assignment of a ship to lift a landing force organization, the ship combat cargo officer and the team embarkation officer arrange a meeting to formulate detailed loading plans. Normally, the ship combat cargo officer contacts the team embarkation officer and arranges the meeting.

33. Embarkation Plans

a. Assembly of assault shipping and movement of troops to embarkation areas are planned by the amphibious task force and

landing force commanders, respectively. These plans are coordinated and distributed as soon as possible to commands having operational control of the assault shipping and troop units scheduled to join the amphibious task force. The plans are also distributed to area and base commanders concerned. This permits the initiation of preliminary movements and preparations to insure that embarkation is begun without unnecessary delays.

b. There are three basic embarkation plans that are normally prepared by the various command levels within the landing force: the landing force embarkation plan, the group embarkation plan, and the unit embarkation plan.

- (1) *The landing force embarkation plan* includes organization for embarkation; supplies and equipment to be embarked; embarkation points and cargo assembly areas; control, movement, and embarkation of personnel; and miscellaneous information. (For type of information included under these major headings, see app. II.) The landing force embarkation plan contains basic information from which the embarkation group commander prepares a more detailed plan.
- (2) *The group embarkation plan* prepared by the embarkation group (division) commander establishes the formation of embarkation units and assigns shipping to each embarkation unit. It contains the same information as the landing force embarkation plan in greater detail. The group embarkation plan has attached to it the group embarkation organization and shipping assignment table (par. 34b(1)).
- (3) *The unit embarkation plan* prepared by the embarkation unit commander establishes the formation of embarkation teams and assigns each embarkation team to a ship. It contains, generally, the same information as the group embarkation order, but in greater detail, and may have the same heading as the group embarkation plan. Attached to the unit embarkation plan is the unit embarkation organization and shipping assignment table (par. 34b(2)).

34. Embarkation Organization and Shipping Assignment Table (figs. 3 and 4)

a. General.

- (1) The embarkation organization and shipping assignment table provides unit, group, and landing force embarkation officers with a convenient worksheet for the allocation of landing force organizations and supplies to

assigned shipping. In final form the table indicates capacity of assigned shipping, number of personnel embarked, distribution of units, and proportion of equipment and supplies embarked in each ship.

- (2) Certain basic information is required for the preparation of the embarkation organization and shipping assignment table. This information includes personnel and tonnage capacities of each ship assigned to the troop organization, number of personnel, square and cubic feet of displacement of the vehicles of each embarked organization, cubic displacement of bulk cargo of each embarked organization, and cubic displacement of reserve supplies. Detailed information on the capacity of each ship is contained in the ship's loading characteristics pamphlet. Information pertaining to troop strength and vehicle and bulk cargo space requirements of landing force troop organizations is contained in the Unit Personnel and Tonnage Table (UP&TT) (DA Form 2535-R) for each unit (par. 42).
- (3) Preparation of the embarkation organization and shipping assignment table is one of the most important steps in initial embarkation planning. The landing force commander must furnish accurate shipping requirements early in the planning phase. Army units which regularly engage in amphibious training or are directed to maintain a state of readiness for participation in amphibious operations will prepare and maintain current unit personnel and tonnage tables, cargo and loading analysis tables, and vehicle summary and priority tables.

b. Preparation of Embarkation Organization and Shipping Assignment Tables (figs. 3 and 4). The embarkation group (division) commander will normally receive an embarkation order, published at landing force level allocating amphibious ships to lift his reinforced command. Upon receipt of this order, the embarkation group commander requires each major troop unit to be embarked to submit a consolidated unit personnel and tonnage table that will include the number of personnel to be embarked and the volume, weight, and square feet (deck space) of materiel to be loaded. Using the unit personnel and tonnage tables furnished by the troop units and the ship's loading characteristics pamphlets furnished by the landing force commander as a basis, the group embarkation officer prepares the group embarkation organization and shipping assignment table. This table is forwarded to the embarkation unit commanders who then prepare the unit embarkation organization and shipping assignment

tables. The group table assigns ships and troop organizations to embarkation units, and the unit table assigns a ship and troop organizations to embarkation teams. The group and unit embarkation organization and shipping assignment tables are prepared on the same form. These tables, prepared early in embarkation planning, are subject to changes for many reasons. The most common cause of changes will be changes in the tactical plan and/or the availability of shipping. When changes are effected, they are entered in the group and unit embarkation organization and shipping assignment tables. Detailed instructions for the preparation of the two tables are given below:

(1) *Group embarkation organization and shipping assignment table* (fig. 3).

(a) The group embarkation officer prepares the group embarkation organization and shipping assignment table. The embarkation organization and shipping assignment table, is used for this purpose and filled in as explained below:

1. On the line entitled *organizations* near the top of the table, beginning with the third column from the left, enter the major components of the tactical organization to be formed into embarkation units (examples: Div Trps, Div Tns, BGLT, BdeLT, BLT, etc.).
2. Down the left-hand column under *organizations*, list each major subordinate command.
3. In the second column from the left alongside each subordinate command, list personnel, vehicle displacement and bulk cargo displacement for the organization. Enter this information on three lines within the block: top line, personnel—officer and enlisted; middle line, vehicles—square feet and short tons; bottom line, bulk cargo—cubic feet and short tons.
4. Break out and assign components of the major subordinate commands to embarkation units in accordance with the tactical organization. In the blocks provided under the embarkation unit columns, enter the same type of information as required in 3 above for the organization or part of an organization assigned to each embarkation unit.
5. After all organizations in the embarkation group have been listed and all block entries have been completed, enter group and unit totals. Draw a double line below the last organization listed, and in the left-hand block enter the title *total troops and equipment*. Enter group

and unit totals on this line: group totals in the second block from the left and unit totals under their respective columns. The combined unit totals must balance group totals.

6. Draw a double line under the group and unit totals, and in the first block under the double line in the left-hand column, enter the title *reserve supplies*. Under reserve supplies, list vertically class I, II, III, IV, and V supplies. List reserve supplies by class, cubic displacement, and weight. In the second column from the left, enter total cubic feet of displacement and weight in short tons for each class of supplies allocated to the embarkation group. In the blocks across the page, enter by class the cubic displacement and weight in short tons of supplies allocated to each embarkation unit.
7. Under the last line of *reserve supplies*, draw a double line and enter the title *total supplies*. On this line, enter totals for the embarkation group and each embarkation unit.
8. Under *total supplies*, draw a double line and enter the title *grand totals*. Grand totals are obtained by adding the totals entered as *total troops and equipment* and *total supplies*. The cubic displacement and weight (short tons) of reserve supplies is added to the cubic displacement and weight (short tons) of bulk cargo indicated in the *total troops and equipment* line. Grand totals indicate totals of landing force personnel, officer and enlisted; vehicle displacement and weight in square feet and short tons; and displacement and weight of bulk cargo in cubic feet and short tons for the embarkation group and each embarkation unit within the group.
9. At the top of the table, designate embarkation units, embarkation unit commanders, and unit embarkation officers.
10. Allocate the shipping assigned to the group to the embarkation units in the spaces provided across the top of the form in the *ship capacity block*. Enter in these spaces ship designation, ship troop capacity in officers and enlisted men, and ship cargo capacity in square and cubic feet. Make the block entry in three lines. The top line indicates type of ship, troop officer capacity, and troop enlisted capacity; the second line, ship number and ship vehicle capacity in square feet;

and the third line, bulk cargo capacity in cubic feet. In initial embarkation planning, ships may be assigned by numbers and types, not by specific ships. When this occurs, show the type of ship with the number of ships assigned to each embarkation unit in parentheses under the ship's abbreviated title. The allocation of shipping to embarkation units should be made as a result of joint conferences of landing force and Navy embarkation staff officers.

11. On the line *total ship capacity*, enter total personnel, vehicles, and bulk cargo capacities of the ships assigned to each embarkation unit. Enter the total capacity of ships assigned to the embarkation group in the second block from the left and the total capacity of ships allocated to each embarkation unit on the same line in each embarkation unit column. The first line in the block indicates ship capacity for officer and enlisted personnel; the second, vehicle space in square feet; the third, bulk cargo space in cubic feet.
- (b) The group embarkation organization and shipping assignment table prepared through the steps described in subparagraph (a) 1 through 8 above may be used by landing force commanders as a basis for estimating the landing force shipping requirements during initial embarkation planning. See paragraph 31.
- (2) *Unit embarkation organization and shipping assignment table* (fig. 4). The unit embarkation officer, upon receipt of the group embarkation plan, prepares the unit embarkation plan or order. The unit embarkation organization and shipping assignment table is an inclosure to the unit embarkation plan. The unit embarkation table assigns troop organizations to individual ships, designates embarkation teams, and appoints embarkation team commanders and team embarkation officers. Before the unit embarkation organization and shipping assignment table is prepared, feeder information must be assembled from the embarkation group and subordinate units. This information includes the group embarkation organization and shipping assignment table, allocated ship's loading characteristics pamphlets, and unit personnel and tonnage tables from all organizations assigned to the embarkation unit. The embarkation organization and shipping assignment table is then completed in the manner indicated below:
 - (a) In the *ship capacity* block beginning in the third

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Figure 3. Group embarkation organization and shipping assignment table.

column from the left, fill in data pertaining to allocated shipping. In each block across the table, enter data pertaining to a single ship. These data are entered in block form vertically as follows: ship name, ship number, troop capacity—officer and enlisted, vehicle capacity in square feet, and bulk cargo capacity in cubic feet. In entering landing ship data, the name of the ship is normally omitted. Data pertaining to each ship as entered in these blocks are extracted from the ships' loading characteristics pamphlets.

- (b) Under the column headed *organization*, list vertically each organization in the embarkation unit.
- (c) In the column beside each organization name, enter data pertaining to the organization on three lines as follows: top line, personnel strength—officer and enlisted; middle line, vehicle displacement in square feet and vehicle total weight in short tons; bottom line, bulk cargo displacement in cubic feet and weight in short tons.
- (d) Break out and assign to ships the organizations in the embarkation unit. Indicate the assignment of organizations to ships in the same manner as in (c) above on the line for each organization under the column heading of the ship assigned. When possible, the assignment of organizations to allocated shipping should be made as a result of a joint conference of corresponding landing force and Navy embarkation staff officers.
- (e) After all organizations assigned to the embarkation unit have been listed and assigned to a ship (team), draw a double line across the page at the bottom of the organizations listed and enter unit and team totals on the line entitled *total troops and equipment*. Enter unit totals in the second block from the left of the table and team totals on the same line under the appropriate columns.
- (f) At the top of the table beginning with the third column from the left, designate embarkation teams, embarkation team commanders, and team embarkation officers. The designations of the embarkation teams are in numbers and phonetic combinations of letters; these are the same letters assigned to the embarkation unit, and the numbers are assigned beginning with number one until all teams have been numbered. For example: Embarkation Unit ECHO would designate teams as ECHO 1, ECHO 2, etc. Embarkation team commanders are normally the senior tactical officers within the team. Team embarkation officers are officers selected on the basis of previous training and/or experience in amphibious loading techniques.
- (g) After the embarkation unit has been assigned to ships as teams and team space requirements have been totaled, list the allocated reserve supplies and allocate them to embarkation teams. Under the line entitled *total troops and equipment*, draw a double line and in

the left-hand column enter the heading *reserve supplies*. On the line under this heading, enter the sub-heading *class I*. Observe that in the unit table, classes of supplies are broken down by type, basis of issue, and packaging method employed within the class. For example, class I is broken down into water, types of rations, etc.; class V into small arms, high explosives, pyrotechnics, etc. Supplies normally consist of class I, III, IV, and V, but class II (initial reserve) may be included.

- (h) In the second column from the left, enter the cubic displacement and short tons of each type of supplies allocated to the unit. On each of these lines across the page enter the same type of information indicating the amounts of these supplies allocated to each embarkation team.
- (i) After all reserve supplies have been entered and allocated, draw a double line across the page and enter the title *total supplies*. Enter team and unit totals on this line. Enter the total supplies allocated to the unit in cubic feet and short tons in the second column from the left. Enter team totals under each team column.
- (j) Under the line *total supplies*, draw a double line and enter the *grand totals* for the embarkation unit and each embarkation team. Grand totals are computed by adding the unit and team totals from the *total troops and equipment* entry to the reserve supplies totals from the *total supplies* entry. The cube and short ton supply totals are added to the bulk cargo cube and short ton totals contained in the unit and team totals listed on the line *total troops and equipment*.

35. Embarkation Unit Planning

a. The formation of embarkation units is based on the landing force organization for landing and the availability of shipping. Typically, an embarkation unit may be composed of a battle group, a brigade, a battalion, division artillery, or division troops. The embarkation group commander designates the commanders of the embarkation units. Normally the commanding officer of the senior troop organization within the embarkation unit is designated as commander.

b. The embarkation unit commander, in coordination with the corresponding Navy commander, organizes his embarkation

EMBARKATION UNIT: DELTA (BALT 928 Inf)

[illegible]

Figure 4. Unit embarkation organization and shipping assignment table.

teams and assigns shipping to each. This information is published in the form of the unit embarkation organization and shipping assignment table which is included as an annex to the unit embarkation order (fig. 4).

c. Where necessary, the embarkation unit commander can organize embarkation elements, each consisting of two or more embarkation teams, or he may form the unit into a combination of elements and teams. The embarkation element is normally formed when a battalion is assigned within an embarkation unit. It is formed primarily to maintain unit integrity and normal chain of command. Embarkation planning for the embarkation element is normally conducted at embarkation unit level.

36. Embarkation Team Planning

The embarkation team initiates embarkation planning when advised of the team composition and ship assignment. The following are included in team embarkation planning:

- a.* Designation of team embarkation officer.
- b.* Preparation and submission of loading forms, Unit Personnel and Tonnage Table (UP&TT) (DA Form 2535-R), Cargo and Loading Analysis Table (C&LAT) (DA Form 2533-R), and Vehicle Summary and Priority Table (VS&PT) (DA Form 2534-R), by organizations assigned to the embarkation team (sec. VI).
- c.* Preparation of the loading plan.
- d.* Designation of ship's platoon and appointment of billeting, mess, and guard officers.
- e.* Selection and movement of the advance party to the embarkation point.
- f.* Establishment of liaison between the team and the embarkation control office in the embarkation areas.
- g.* Movement of supplies and equipment to the embarkation point.
- h.* Security of cargo in the cargo assembly area.
- i.* Movement of personnel to the embarkation point.

SECTION VI

LOADING PLAN

37. Preparation of Loading Plans

a. The loading plan for each ship is prepared by the team embarkation officer, assisted by the ship combat cargo officer. The embarkation team commander and the ship's captain approve the loading plan before loading commences and approve all changes required thereafter. Loading plans must also be approved by embarkation group and transport group commanders. Officers charged with the preparation of loading plans must insure that the plans are accurate. The weight and the square and cubic measurements entered on the loading forms are the actual weight, square, and cube of the supplies or equipment to be loaded. The increased use of helicopters in amphibious operations makes weight factors particularly important. Inaccurate figures may result in inefficient use of shipping, assault craft, and/or aircraft; impair safety of personnel; and affect the tactical plan by their effect upon the selection of ship-to-shore means.

b. Each organization embarking personnel, equipment, and/or supplies in an assigned transport prepares the following forms: DA Form 2431-R (Unit Cargo Manifest (UCM) (Less Vehicles)), DA Form 2533-R, DA Form 2534 and DA Form 2535-R. The team embarkation officer reviews the forms and tables submitted by the troop units within the embarkation team for accuracy and completeness. When all submitted feeder reports have been accepted and approved, the team embarkation officer accomplishes the following steps in the order shown:

- (1) Consolidates unit personnel and tonnage tables.
- (2) Consolidates cargo and loading analysis reports.
- (3) Obtains debarkation priorities and composition of tactical serials from the embarkation team commander.
- (4) Consolidates vehicle summary and priority tables.
- (5) Prepares vehicles and heavy-lift templates.
- (6) Lays out stowage diagrams in proper horizontal and vertical order.
- (7) Plans stowage of vehicles in accordance with priorities assigned.

- (8) Plans stowage of ammunition and rations to be issued troops before debarkation.
- (9) Plans the stowage of general (bulk) cargo.
- (10) Fills in stowage diagrams and prepares stowage diagram manifests. Balances the cube and weight of the manifest with the unit personnel and tonnage table.
- (11) Completes the *where stowed* column of the consolidated Cargo and Loading Analysis Table (C&LAT) (DA Form 2533-R) and the consolidated Vehicle Summary and Priority Table (VS&PT) (DA Form 2534-R).
- (12) Prepares and maintains a time study in order to balance the unloading time of the holds as nearly as possible.
- (13) Prepares the consolidated embarkation and tonnage table.
- (14) Prepares the profile loading diagram and balances it against the consolidated unit personnel and tonnage table.
- (15) Assembles the loading plan in the following order:
 - (a) Loading Plan Cover (DA Form 2532-R).
 - (b) Consolidated Embarkation and Tonnage Table (DA Form 2536-R).
 - (c) Consolidated Unit Personnel and Tonnage Table (DA Form 2535-R).
 - (d) Consolidated Cargo and Loading Analysis Table (C&LAT) (DA Form 2533-R).
 - (e) Consolidated Vehicle Summary and Priority Table (VS&PT) (DA Form 2534-R).
 - (f) Stowage diagrams.
 - (g) Profile loading diagram. (Omit for landing ships and submarines.)

c. Instructions for preparing the forms included in the loading plan are contained in paragraphs 39-46. Examples of these forms are shown in figures 6-13. Figures pertaining to organizations entered in these forms are for illustrative purposes only and *must not* be used in planning.

38. Unit Cargo Manifest

(fig. 5)

Each unit or detachment assigned to an embarkation team prepares a DA Form 2531-R, (Unit Cargo Manifest (UCM) (Less Vehicles)), which will be locally reproduced on 8" x 10½" paper, as shown in figure 5. This manifest is retained by the unit and provides the basis for preparing the cargo and loading analysis

table. The unit cargo manifest provides detailed data pertaining to the content of each container or package loaded aboard ship. It is invaluable to unit commanders for identifying and locating their property and supplies after landing. This is the only document that allows for positive identification of property by the unit. The unit cargo manifest is not submitted to the embarkation team commander and is not included in the loading plan. A description of the manifest by column heading follows:

a. UP&TT Line Number (Col. a). Cargo is listed in sequence according to unit-personnel-and-tonnage-table (UP&TT) line numbers.

b. Box Number or Number of Items (Col. b). The box number or number of identical items is contained in this column. Boxes, crates, or packages that are identical in cube and weight can be grouped together. Others must be listed separately. Boxes, crates, or packages that are identical, but contain supplies or equipment that are essential to the operation of a unit, are listed separately and are given unit numbers to assist in identifying the boxes and locating supplies in them.

c. Description (Col. c). Enter here the complete nomenclature shown in the TA or TOE. Dimensions are given in feet and inches for heavy lifts (par. 40b(7)), for example: "Auger, earth, skid mounted (19' 0", 8' 0", 9' 0")." If the loading plan is for a submarine, the dimensions of all cargo are listed.

d. Standard Cargo (Cols. d and e). Enter in this column the volume (cubic feet) and weight (pounds) of cargo packaged in conventional containers such as boxes, drums, and cans requiring stowage space aboard ship.

e. Unitized Cargo and Heavy Lifts (Cols. f, g, and h). Enter in this column the deck space (square feet), volume (cubic feet), and weight (pounds) of unitized cargo (palletized unit loads and containerized loads) and heavy lifts (items of cargo not mobile loaded, each weighing over 800 pounds and/or displacing over 100 cubic feet). Unitized cargo and heavy lifts are listed separately by type of package and weight. Palletized units, containers, or heavy lifts identical in content, dimensions, and weight are grouped, and the number of packages within each group is entered under the column *box number or number of items*. Footnotes may be entered on the form to indicate dimensions, weight, and content of unitized loads and heavy lifts.

f. Mobile Loaded (Cols. i and j). Enter in this column the volume and weight of cargo preloaded in vehicles. List mobile-loaded cargo separately from other cargo of the same UP&TT

line number and make a separate entry for each type of cargo loaded in each vehicle. To denote the manner in which cargo loaded in vehicles is packaged, appropriate symbols may be used and explained by footnotes. For vehicle identification, organizational vehicle numbers may be entered alongside entries in the *mobile-loaded* column.

UNIT CARGO MANIFEST (UCM) (Less Vehicles) (FM 60-30)					PAGE NO.		NO. OF PAGES		
UNIT Co "A" 3d Inf Bn			SHIP QUINCY (APA 070)			DATE 25 Aug 60			
UP&TT LINE NO. a	BOX NO. OR NO. OF ITEMS b	DESCRIPTION c	STANDARD CARGO		UNITIZED CARGO AND HEAVY LIFTS			MOBILE LOADED	
			CUBIC FEET d	WEIGHT (Lb) e	SQUARE FEET f	CUBIC FEET g	WEIGHT (Lb) h	CUBIC FEET i	WEIGHT (Lb) j
1	184 bag	Duffle Bags	294	2591	-	-	-	353	2899
		LINE TOTALS	(294)	(2591)				(353)	(2899)
5	81 box	Rations, Combat, Individual, "C"			35	138	3210		
	1 box	Rations, Assault						0.4	39
	97 box	Rations, Small Det (3-1)						179	2850
		LINE TOTALS			(35)	(138)	(3210)	(180)	(2889)
15	20 can (5 gal)	Lube Oil, SAE 30	12	480				8	320
	2 can (2 lb)	Grease, GP						1	20
		LINE TOTALS	(12)	(480)				(9)	(340)
24	No. 7	Tent, Mess	4.5	287					
	No. 8	Tent, Command Post	6.1	328					
		LINE TOTALS	(11)	(615)					
		GRAND TOTALS	2542	64000	285	1139	28800	2659	67200

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(Entries in italics are sample entries only.)

Figure 5. Unit cargo manifest.

39. Loading Plan Cover

(fig. 6)

a. The Loading Plan Cover (DA Form 2532-R), which will be locally reproduced on 8" x 13" paper, is depicted in figure 6. The cover page lists the designations of the ship, the embarkation team, and the embarking troop units. In addition, it contains signatures of the embarkation team commander and the ship's commanding officer denoting approval. When the ship is not near the embarkation team headquarters during planning, approval of the loading plan by the ship's commander is obtained by the following procedure:

- (1) Upon completing the tentative loading plan, the team embarkation officer submits two copies to the embarkation team commander for approval.
- (2) The embarkation team commander indicates his approval by signing the cover page. He forwards the loading plan to the ship's commander by the most expeditious means and requests concurrence.
- (3) The ship's commander indicates approval by signing the cover page below the signature of the embarkation team commander. If the approval is qualified and the embarkation team commander does not concur with the qualifying remarks, the subject is referred to the next parallel superiors in command.

b. Reproduction and distribution of the plan is accomplished by the embarkation team commander in accordance with administrative standing operating procedures or other instructions.

40. Cargo and Loading Analysis Table

(fig. 7)

a. The Cargo and Loading Analysis Table (C&LAT) (DA Form 2533-R), which will be locally reproduced on 8" x 13" paper, is a detailed breakout of the cargo listed as single line entries on the unit personnel and tonnage table. This form is prepared, with the exception of the *where stowed* column, by each embarking organization. It lists all cargo (less vehicles) and indicates cargo to be stowed as standard cargo, unitized or heavy-lift cargo, and mobile-loaded cargo. Information from the forms submitted by each organization embarking on a single ship is consolidated by the team embarkation officer into a consolidated cargo and loading analysis. The consolidated cargo and loading analysis and the vehicle summary and priority table provide the basis for stowage plans. The final step in compiling the consolidated cargo and loading analysis is filling in the *where stowed* column for each entry

on the form. Information contained in this table is of vital importance to logistic control personnel during the ship-to-shore movement since the completed form indicates the stowage location of all cargo, less vehicles, for each ship.

b. An explanation of each column of the cargo and loading analysis form follows:

- (1) *UP&TT line number.* (Col. a). Starting with line 1, list in numerical sequence UP&TT line numbers 1, 2, 3, 5, 6, 8, 9, 10, 11, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 24, and 25, as applicable.
- (2) *Unit* (Col. b). Indicate in this column the unit to which cargo belongs. Always show a unit designation for cargo listed opposite UP&TT line numbers 1, 2, and 3 since these line numbers include only authorized unit allowances. You may or may not show a unit designation for cargo listed opposite other UP&TT line numbers, depending on unit responsibility and/or requirement for the cargo. List under the *unit* column as belonging to *all* any cargo allocated to an embarkation organization for loading and transportation only and any cargo loaded aboard ship for equal distribution to all embarked organizations. List the organization designation for cargo required by an organization upon landing and for cargo loaded in a vehicle.
- (3) *Description* (Col. c). Enter in this column the complete nomenclature as shown in appropriate allowance lists and tables of equipment or other descriptive documents. Record dimensions (length, width, and height) of heavy lifts in feet and inches immediately below the entry to which applicable. List items individually within each UP&TT line number grouping.
- (4) *Number and type containers* (Col. d). Enter the number and type of containers in this column. When different types of containers are used to package the same item, enter each type of container separately.
- (5) *Number of rounds, gallons, rations, etc.* (Col. e). Enter in this column the number of individual units, such as rounds, gallons, or rations. These are the individual units packed in the containers listed in the *number and type container* column.
- (6) *Standard cargo* (Cols. f and g). Enter in this column the volume (cubic feet) and weight (pounds) of standard cargo. Standard cargo, as used here, is cargo packaged

in conventional containers such as boxes, cases, drums, and cans.

- (7) *Heavy lifts and unitized cargo* (Cols. h, i, j and k). Enter in this column deck space (square feet), volume (cubic feet), and weight (pounds) of unitized cargo and heavy lifts. (A heavy lift is an individual box, crate, or package, not mobile loaded, over 800 pounds in weight and/or over 100 cubic feet in volume. Vehicles and unitized cargo are not included in this category.) List palletized, containerized, and heavy-lift cargo separately within this column. Group pallets, containers, or heavy lifts identical in content, dimensions, and weight. When pallets, containers, or heavy lifts are grouped, indicate the number of lifts under the column *No. lifts*. Footnotes may be used on the form to indicate square, cube, weight, and number of items per pallet, container, or heavy lift.
- (8) *Mobile loaded* (Cols. l and m). Enter in this column the volume and weight of cargo preloaded in vehicles. List mobile-loaded cargo separately from other cargo of the same UP&TT line number on this form, and make a separate entry for each type of cargo loaded in each vehicle. To denote the manner in which cargo loaded in vehicles is packaged (loose, pallet, container), appropriate symbols may be used and explained by footnotes at the bottom of the page upon which the entry is made.
- (9) *Where stowed* (Col. n). Enter in this column the assigned stowage space for the cargo aboard ship. For standard, unitized, and heavy-lift cargo, the hold number and deck level assigned for stowage of the cargo are entered. Enter mobile-loaded cargo in this column by the unloading priority number assigned in the consolidated vehicle summary and priority table of the vehicle in which the cargo is stowed.
- (10) *Totals*. Totals include UP&TT line totals, page totals, grand totals, and total cargo.
 - (a) *UP&TT line totals*. After items for each UP&TT line number have been listed, draw a double line across the form to separate line numbers. Enter totals for standard cargo, unitized cargo, heavy lifts, and mobile loaded columns in parentheses above the double line. Line number totals must correspond to UP&TT line totals.
 - (b) *Page totals*. Total each page by adding all line number totals appearing on a single page.

CARGO AND LOADING ANALYSIS TABLE (C&LAT) (FM 60-30) (Consolidated)				UNIT		SHIP				PAGE NO.		NO. OF PAGES	
UP&TT LINE NO. a	UNIT b	DESCRIPTION c	NO. AND TYPE CONTAINERS d	NO. ROUNDS, GALLONS, RATIONS, etc. e	STANDARD CARGO		HEAVY LIFTS AND UNITIZED CARGO (Pallets, containers, etc.)				MOBILE LOADED		WHERE STOWED n
					CUBIC FEET f	WEIGHT (Pounds) g	NO. LIFTS h	SQUARE FEET i	CUBIC FEET j	WEIGHT (Pounds) k	CUBIC FEET l	WEIGHT (Pounds) m	
5	All	Ret, Cmbt, Indiv, "C"	748 cases	4488			14*	224	897	37000			3d Plat No. 5
	All	Ret, Indiv, Cmbt	560 cases	2240**	477	12400							2d Dk No. 5
	Hq & Hq 3d Int Bn	Ret, Small Det (S-1)	63 cases	310							67	1757	Veh No. 13
	Hq & Hq 3d Int Bn	Ret, Small Det (S-1)	63 cases	310							67	1757	Veh No. 17
	Hq & Hq 3d Int Bn	Ret, Small Det (S-1)	63 cases	310							67	1757	Veh No. 19
	Co A, 3d Int Bn	Ret, Small Det (S-1)	115 cases	579							125	3281	Veh No. 7
	Co B, 3d Int Bn	Ret, Small Det (S-1)	115 cases	579							125	3281	Veh No. 9
	Co C, 3d Int Bn	Ret, Small Det (S-1)	115 cases	579							125	3281	Veh No. 11
	All	Cooker (Field Emerg)	20 boxes	6000**	38	1400							
		LINE TOTALS			(515)	(13800)	(14)	(224)	(897)	(37000)	(576)	(15114)	
PAGE TOTALS													XXX
GRAND TOTALS (Last page only)													XXX
TOTAL CARGO		SQUARE FEET (Unitized and heavy lift only)			CUBIC FEET		WEIGHT		XXX				

(Entries in italics are sample entries only.)

Figure 7. Consolidated cargo and loading analysis table.

- (c) *Grand totals.* Enter on the last page the grand total of cubic feet and weight of all cargo and the grand total of square feet of unitized and heavy-lift cargo. These totals are derived by adding page totals; they may be checked by adding all line-number totals appearing on the form. Grand totals will appear under the *standard cargo, heavy lifts and unitized cargo, and mobile loaded columns.*
- (d) *Total cargo.* Enter total-cargo entries on the last page below the grand totals. The total-cargo entries are square feet of heavy-lift and unitized cargo and total cubic feet and total weight of all cargo. The cube and weight totals entered here must correspond to the entries on line 32 of the Unit Personnel and Tonnage Table (UP&TT) (DA Form 2535-R).

41. Vehicle Summary and Priority Table

(fig. 8)

a. The Vehicle Summary and Priority Table (VS&PT) (DA Form 2534-R), which will be locally reproduced on 13" x 8" paper, is prepared by each embarking troop organization. The table is submitted to the team embarkation officer with the *where stowed* column left blank. The team embarkation officer, after studying the landing plan, holds a conference with representatives of the embarkation team to determine priorities required to support the landing plan. Overall priority for unloading is determined by the embarkation team commander after considering the priorities desired by each organization and insuring that priorities are assigned so as to conform to requirements of the landing plan. When the unloading priorities have been assigned, the team embarkation officer consolidates the vehicle data submitted by all organizations in a consolidated vehicle summary and priority table in which he enters the assigned unloading priority number. The consolidated vehicle summary and priority table provides the basis for the preparation of stowage diagrams of the various cargo compartments on each ship. The table is also useful to personnel concerned with unloading during the ship-to-shore movement.

b. For the purpose of this table, the term *vehicle* describes an uncrated item of equipment that consumes fuel or can be towed by a wheeled or tracked vehicle.

- c. The vehicle summary and priority table is filled in as follows:
- (1) *Unloading priority number* (Col. a). Under this column enter priority numbers indicating the sequence in which

VEHICLE SUMMARY AND PRIORITY TABLE (VS&PT) (FM 60-30) (Consolidated)				UNIT <i>Hq & Hq Co, 3d Inf Bn</i>				SHIP <i>USS QUINCY (APA 70)</i>				PAGE NO.	NO. OF PAGES
UNLOADING PRIORITY NO. a	LANDING SERIAL NO. b	TYPE VEHICLE c	UNIT d	VEHICLE REGISTRA- TION NO. e	LENGTH f	WIDTH g	HEIGHT h	SQUARE FEET i	CUBIC FEET j	NET WEIGHT OF VEHICLE (Pounds) k	CARGO LOADED IN VEHICLE (Pounds) l	GROSS WEIGHT OF VEH (Pounds) m	WHERE STORED n
28	116	Trk, Util, 1/4 T	Hq & Hq Co	0014789	11' 1"	5' 2"	4' 7"	42	262	2625	- -	2625	2d Plt No. 1
29	116	Trk, Util, 1/4 T	Hq & Hq Co	3306544	11' 1"	5' 2"	4' 7"	42	262	2625	- -	2625	2d Plt No. 1
30	116	Trk, Util, 1/4 T	Hq & Hq Co	0347628	11' 1"	5' 2"	4' 7"	42	262	2625	- -	2625	2d Plt No. 1
31	116	Trk, Util, 1/4 T	Hq & Hq Co	3337778	11' 1"	5' 2"	4' 7"	42	262	2625	- -	2625	2d Plt No. 1
32	117	Trk, Cgo, 1 1/4 T	Hq & Hq Co	1165436	13' 10"	8' 3"	6' 11"	113	780	2400	2880	5280	LII No. 4
33	117	Trk, Cgo, 2 1/4 T	Hq & Hq Co	1667755	22' 11"	8' 0"	9' 3"	183	1684	13170	4780	17950	LII No. 4
34	117	Trk, Cgo, 1 1/4 T	Hq & Hq Co	1664327	13' 10"	8' 3"	6' 11"	113	780	2400	2365	4765	LII No. 4
35	117	Trk, Cgo, 2 1/4 T	Hq & Hq Co	1543876	22' 11"	8' 0"	9' 3"	183	1684	13170	3675	16845	LII No. 4
36	118	Trk, Util, 1/4 T	Hq & Hq Co	1345879	11' 1"	5' 2"	4' 7"	42	262	2625	- -	2625	1st Plt No. 5
37	118	Trk, Cgo, 3/4 T	Hq & Hq Co	0032555	12' 3"	6' 2"	6' 11"	75	517	1340	980	2320	2d Plt No. 5
38	118	Trk, Cgo, 3/4 T	Hq & Hq Co	0032447	16' 10"	6' 2"	5' 4"	97	515	6000	1300	7300	2d Plt No. 5
39	118	Trk, M Wrecker	Hq & Hq Co	1176543	25' 10"	8' 1"	8' 7"	208	1792	33675	- -	33675	LII No. 4
40	119	Trk, Util, 1/4 T	Hq & Hq Co	0017654	11' 1"	5' 2"	4' 7"	42	262	2625	- -	2625	LII No. 4
TOTAL VEHICLES								5602	51360	690763	86610	894515	XXX
PAGE TOTALS/GRAND TOTALS								1226	9324	87905	15980	103885	XXX

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(Entries in Italics are sample entries only.)

Figure 8. Consolidated vehicle summary and priority table.

vehicles are to be unloaded from the ship. Priority numbers are assigned by the embarkation team commander.

- (2) *Landing serial number* (Col. b). In this column enter the landing serial number from the serial assignment table (FM 31-13).
- (3) *Type vehicle* (Col. c). In this column enter the correct vehicle nomenclature.
- (4) *Unit* (Col. d). In this column enter the unit to which each vehicle is assigned.
- (5) *Vehicle registration number* (Col. e). In this column enter the U.S. identification number appearing on the vehicle.
- (6) *Length, width, and height columns* (Cols. f, g and h). In each of these columns enter the appropriate gross dimension in feet and inches (9' 6", etc.).
- (7) *Square feet* (Col. i). In this column enter the square feet of deck space required for each vehicle. Obtain square footage by reducing measurements in feet and inches to decimal equivalents of feet and multiplying length times width.
- (8) *Cubic feet* (Col. j). In this column enter the volume of space (cubic feet) that the vehicle will occupy *as it is to be loaded aboard ship*. Reduce dimensions of feet and inches to decimal equivalents of feet, and multiply length, width, and height to obtain cubic feet.
- (9) *Net weight of vehicle* (Col. k). In this column enter the empty weight of the vehicle in pounds.
- (10) *Cargo loaded in vehicle* (Col. l). In this column enter in pounds the weight of the cargo loaded in each vehicle.
- (11) *Gross weight of vehicle* (Col. m). In this column enter in pounds the totals of the two preceding columns. Transfer the gross weight of the vehicle to the unit personnel and tonnage table on the appropriate line number and in the proper column (par. 42).
- (12) *Where stowed* (Col. n). In this column enter the hold number and deck level where the vehicle is to be stowed. This information is extracted from the hold stowage plan.

42. Unit Personnel and Tonnage Table (fig. 9)

a. Each troop organization assigned to an embarkation team prepares and submits to the team embarkation officer a Unit

Personnel and Tonnage Table (UP&TT) (DA Form 2535-R), which will be locally reproduced on 8" x 10½" paper. The completed table indicates number of personnel; cubic displacement and weight of all cargo; cubic displacement and weight of mobile-loaded cargo; and deck space (square feet), volume, and weight of all cargo requiring space aboard ship. The data contained in the unit personnel and tonnage table include, in condensed form, a recapitulation of the data in the cargo and loading analysis table and the vehicle summary and priority table. In the unit personnel and tonnage table, supplies and equipment embarked by landing force organizations are divided into six types: troop space cargo, rations, ammunition, POL, other class II and IV supplies, and vehicles. Line totals for each type of cargo are taken from the cargo and loading analysis table. The cubic feet and weight totals of standard, palletized, heavy-lift, and mobile-loaded cargo, as entered in the cargo and loading analysis table, are totaled and these totals are entered under the *line total* column on the UP&TT. The cubic feet and weight of mobile-loaded cargo are also extracted from the cargo and loading analysis table and entered on the appropriate line of the UP&TT under the *mobile loaded* column. Data entered in the column *cargo space requirement* in cubic feet and weight are obtained by deducting the cubic feet and weight entered under *mobile loaded* column from *line total* column by UP&TT line number. The square feet data entered under *cargo space requirement* column pertains *only* to heavy lifts and unitized cargo and is taken from the *heavy-lift and unitized cargo* column of the *cargo and loading analysis (C&LA)* by line number. Data pertaining to vehicles are taken from the vehicle summary and priority table (VS&PT).

b. The team embarkation officer uses the tables submitted by each embarking organization as feeders to prepare the team (consolidated) Unit Personnel and Tonnage Table (UP&TT) (DA Form 2535-R). When forwarding the consolidated unit personnel and tonnage table, the team embarkation officer attaches a copy of each feeder report used to prepare the team consolidation. Team consolidations are further consolidated at unit level, and the embarkation team unit personnel and tonnage tables are attached to the embarkation unit consolidation when it is forwarded to the embarkation group. The consolidations, with feeders attached, allow staff officers at each echelon in the organization for embarkation to prepare plans based upon the same information available to their subordinate organizations. A consolidated unit personnel and tonnage table is illustrated in figure 9. An analysis of each line number follows:

- (1) *Line 1—Baggage.* Individual clothing and equipment other than that equipment part of the uniform of the soldier upon landing.
- (2) *Line 2—Combat Equipment.* Items carried ashore by assault troops and necessary in the early stages of fighting. This equipment has the highest priority and is stowed in troop billeting spaces where it is accessible for maintenance.
- (3) *Line 3—Office Equipment.* Office equipment and supplies necessary for administration during the voyage.
- (4) *Line 4—Total.* Totals of lines 1 through 3.
- (5) *Line 5—Rations.* All types of rations.
- (6) *Line 6—Water.* Water in containers such as cans or drums. Water in trailers is included in line 29.
- (7) *Line 7—Total.* Totals of lines 5 and 6.
- (8) *Line 8—Small Arms.* Small arms ammunition of caliber .50 or smaller.
- (9) *Line 9—High Explosives.* High explosives such as artillery and mortar ammunition, grenades, powder and propelling charges, and dynamite.
- (10) *Line 10—Pyrotechnics.* Sensitive high explosives such as fuzes and blasting caps which require special stowage.
- (11) *Line 11—Other (Special).* Items such as missiles, CBR munitions, etc.
- (12) *Line 12—Total.* Total of lines 8 through 11.
- (13) *Line 13—Gasoline.* All types of gasoline (less aircraft fuels), packaged and in bulk.
- (14) *Line 14—Diesel.* Bulk and packaged diesel fuel.
- (15) *Line 15—Lubricants.* All classes of lubricants (greases and oils), packaged and in bulk.
- (16) *Line 16—Aircraft Fuels.* All types of aircraft fuels, packaged and in bulk.

Note. The cargo and loading analysis table must include break-out of octane rating and manner of packaging for each type of fuel. For example, 80 octane gasoline may be carried in 5-gallon cans, 55-gallon drums, and in bulk. A separate line entry must be made in the cargo and loading analysis form for each type of packaging employed by octane rating.
- (17) *Line 17—Total.* Total of lines 13 through 16.
- (18) *Line 18—Chemical.* All class II and IV Chemical Corps supplies and equipment not included in the lines above.
- (19) *Line 19—Engineer.* All class II and IV Corps of Engineers supplies and equipment not included in the lines above.

- (20) *Line 20—Medical.* All class II and IV Medical Corps supplies and equipment not included in the lines above.
- (21) *Line 21—Ordnance.* All class II and IV Ordnance Corps supplies and equipment not included in the lines above.
- (22) *Line 22—Signal (Electronics).* All class II and IV Signal Corps supplies and equipment not included in the lines above. Electronics is Navy terminology for signal items.
- (23) *Line 23—Transportation.* All class II and IV Transportation Corps supplies and equipment not included in the lines above.
- (24) *Line 24—Quartermaster.* All class II and IV Quartermaster Corps supplies and equipment not included in the lines above.
- (25) *Line 25—Motor Transport.* A U.S. Marine Corps supply classification which includes vehicle parts.
- (26) *Line 26—Total.* Totals of lines 18 through 25.
- (27) *Line 27—Wheeled.* All wheeled self-propelled vehicles. Vehicles preloaded in landing craft or amphibious vehicles for delivery to the objective area by LSD type shipping or vehicles piggyback loaded into larger vehicles are mobile loaded.
- (28) *Line 28—Tracked.* All tracklaying self-propelled vehicles. See (27) above for definition of mobile-loaded vehicles.
- (29) *Line 29—Trailers.* All vehicles towed by wheeled or tracked vehicles. See (27) above for definition of mobile-loaded vehicles.
- (30) *Line 30—Other.* Other items of equipment classed as vehicles during amphibious operations. (In amphibious operations, vehicles are defined as fuel consuming or towed. Included in this classification are landing force ship-to-shore landing means (surface and air), skid-mounted generators, etc.)
- (31) *Line 31—Total.* Total of lines 27 through 30. (All data entered on this form pertaining to vehicles must indicate gross volume and weight.)
- (32) *Line 32—Total Cargo.* Totals of lines 4, 7, 12, 17, 26, and 31 under *line total* column.
- (33) *Line 33—Total Mobile-Loaded Cargo.* Totals of lines 4, 7, 12, 17, 26, and 31 under *mobile loaded* column.
- (34) *Line 34—Total Cargo Space Requirement.* Totals of lines 4, 7, 12, 17, 26, and 31 under *cargo space requirements* column.

UNIT PERSONNEL AND TONNAGE TABLE (UP&TT)									
(FM 60-30) (Consolidated)									
OFFICER	GEN	COL	LT COL	MAJ	CAPT	LT	WO	TOTAL OFF	
				16	44	77	17	159	
ENLISTED	NCO			OTHER ENLISTED				TOTAL EM	
	792			2491				3283	
TOTAL PERSONNEL								3442	
UP&TT LINE NO.	ITEM	CUBIC FEET	WEIGHT (Pounds)	CUBIC FEET	WEIGHT (Pounds)	SQUARE FEET	CUBIC FEET	WEIGHT (Pounds)	
xxx	TROOP SPACE CARGO	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
1	Baggage	17552	166668	3817	36666	-	13535	130002	
2	Combat Equipment	1203	20447	1203	20447	-	-	-	
3	Office Equipment	532	12729	223	5346	-	309	7383	
4	TOTAL	19087	199844	5243	62459	-	13844	137385	
xxx	RATIONS & WATER	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
5	Rations	7851	285260	2418	87692	560	5433	197568	
6	Water	213	92480	213	92480	-	-	-	
7	TOTAL	8064	377740	2631	180172	560	5433	197568	
xxx	AMMUNITION	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
8	Small Arms	8359	316200	3510	132804	48	4849	183396	
9	High Explosives	9346	353600	3925	148512	-	5421	205088	
10	Pyrotechnics	61	2380	-	-	-	61	2380	
11	Other (Special)	2085	57800	875	24276	173	1210	33524	
12	TOTAL	19851	729980	8310	305592	221	11541	424388	
xxx	POL	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
13	Gasoline	3000	178500	1500	89250	*64	1500	89250	
14	Diesel	1500	89250	750	44625	*32	750	44625	
15	Lubricants	496	33745	496	33745	-	-	-	
16	Aircraft Fuels	-	-	-	-	-	-	-	
17	TOTAL	4996	301495	2746	167620	*96	2250	133875	
xxx	OTHER CLASS II & CLASS IV SUPPLIES	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
18	Chemical	720	2235	302	938	-	418	1297	
19	Engineer	8110	251950	4406	106819	80	3704	145131	
20	Medical	1351	41983	567	17632	-	784	24351	
21	Ordnance	10362	321891	4352	135194	32	6010	186697	
22	Signal (Elet)	5857	181961	2459	76423	-	3398	105338	
23	Transportation	3154	98302	1324	41286	32	1830	57016	
24	Quartermaster	15499	481485	6509	202223	320	8990	279262	
25	Motor Transport	-	-	-	-	-	-	-	
26	TOTAL	45053	1399937	19919	580513	464	25134	799292	
xxx	VEHICLES	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
27	Wheeled	679668	6180802	54036	1481126	71349	625632	4699676	
28	Tracked	218713	6556849	72045	1974753	23061	146668	4582096	
29	Trailers	190156	3327207	18281	791596	18017	171875	2535811	
30	Other	57295	1427217	-	-	8527	57295	1427217	
31	TOTAL	1145832	17492075	144362	4247273	120954	1001470	13244800	
xxx	TOTALS	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
32	Cargo	1242883	20501071						
33	Mobile Loaded Cargo			183211	5543631				
34	Cargo Space Requirement					122295	1059672	14937308	
EMBARKATION ORGANIZATION				DATE		MEASUREMENT		SHORT TONS	
Unit: DELTA (BdeLT no. 1)				1 Sep 60		TONS			
						26491.8		7468.4	
SIGNATURE OF EMBARKATION OFFICER				APPROVED (Signature of Embarkation Org Commander)					
Robert R. Ringo				Charles L. Beachum				*Pelletized 5-gal can (Deck Stow)	
ROBERT R. RINGO, Major, INF				CHARLES L. BEACHUM, Col, INF					

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(Entries in Italics are sample entries only.)

Figure 9. Consolidated unit personnel and tonnage table.

c. The completed unit personnel and tonnage table provides embarkation officers, combat cargo officers, and commanding officers of the landing force and naval organizations involved in an amphibious operation with an accurate tabulation of personnel and cargo to be embarked and shipping space requirements. This table is the basic document around which detailed embarkation plans are prepared.

43. Consolidated Embarkation and Tonnage Table

(fig. 10)

a. The Consolidated Embarkation and Tonnage Table (DA Form 2536-R), which will be locally reproduced on 8" x 10½" paper, is a list of all units embarked in a single ship together with the total personnel and total cubic feet, square feet, and short tons of cargo. The information contained in this table is taken from the feeder unit personnel and tonnage tables submitted by each troop unit to the team embarkation officer. The personnel and tonnage data contained in the feeder tables are entered in the consolidated embarkation and tonnage table by the team embarkation officer. The total number of personnel, troop space cargo data, class II and IV cargo data, and vehicle data are consolidated and entered for each unit. Rations (class I), ammunition (class V), and POL (class III) data are consolidated for all units assigned to the embarkation team and listed as one entry opposite the heading *reserve supplies*.

b. The consolidated embarkation and tonnage table is prepared in the following sequence:

- (1) Assemble feeder unit personnel and tonnage tables submitted by each organization to be embarked on the assigned ship.
- (2) At the top of the form, in the blocks provided, enter ship designation, embarkation team designation, and name of the embarkation team commander.
- (3) Under the column *organization* enter the designation of each unit that has submitted a feeder unit personnel and tonnage table.
- (4) Across the page, under appropriate columns, enter personnel and cargo data pertaining to each unit. Data entered are extracted from lines 4, 26, and 31 under the column *cargo space requirements* (cols. g, h, and i) in the feeder unit personnel and tonnage table submitted by each embarking organization.
- (5) When all of the organizations to be embarked and the data pertaining to personnel and cargo have been

CONSOLIDATED EMBARKATION AND TONNAGE TABLE (FM 60-30)				PAGE NO.	NO. OF PAGES	
SHIP USS QUINCY (APA 070)		EMBARKATION TEAM ECHO No. 2		EMBARKATION TEAM CMD H. E. PARKER, Col, Inf		
ORGANIZATION	PERSONNEL			CARGO		
	OFFI- CEP	EN- LISTED	TOTAL	SQUARE FEET	CUBIC FEET	SHORT TONS
Hq & Hq Co, BG 1	16	190	206	140*	14976	85.0
Co "A"	6	187	193	60*	3974	79.6
Co "B"	6	187	193	60*	3974	79.6
Co "C"	6	187	193	60*	3974	79.6
1st Plst, Co "D" 4th Sig Bn	1	30	31		609	12.7
Det, Avn Co	1	1	2	-	-	-
Reserve supplies				144*	10973	268.7
*Pelletized cargo, only						
TOTALS	67	1428	1495	464*	18248	616.8

Figure 10. Consolidated embarkation and tonnage table.

entered, under the column *organization* enter *reserve supplies*. Under the column *cargo* enter on one line consolidated data pertaining to rations, ammunition, and POL. Data entered are a consolidation of the data contained on lines 7, 12, and 17 in the column *cargo space* requirement (cols. g, h, and i) in the feeder unit personnel and tonnage tables.

- (6) Across the bottom of the form on the line provided, enter column totals. The totals entered on this form must agree with the personnel and cargo totals (line 34) in the team consolidated unit personnel and tonnage table.

44. Stowage Diagram

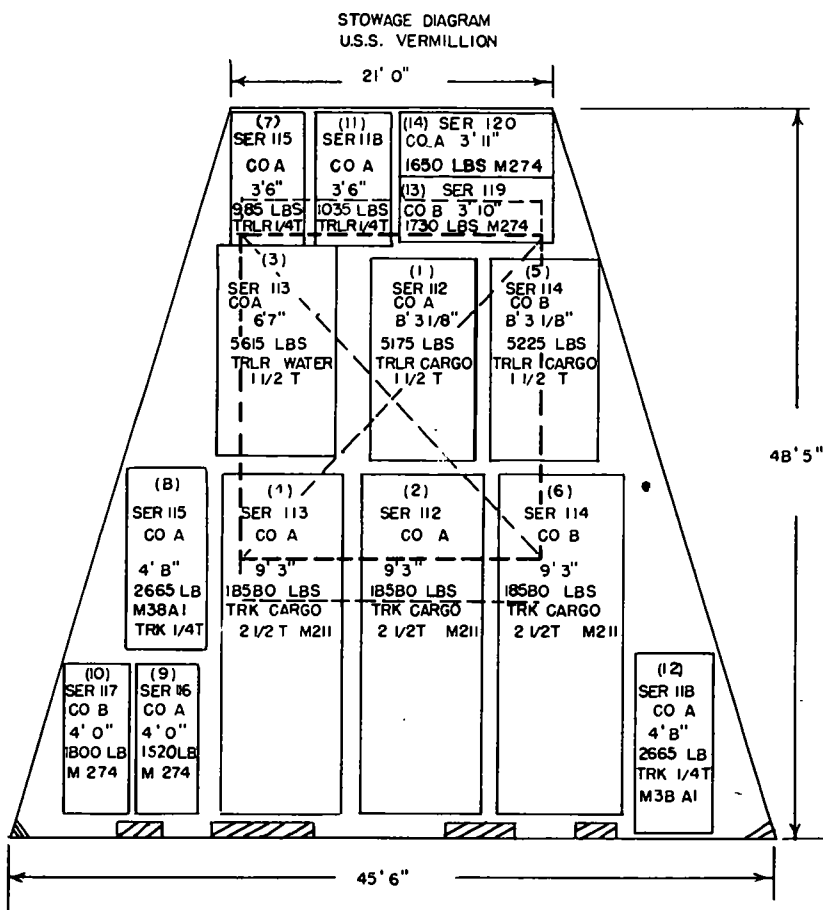
(fig. 11)

The stowage diagram is a graphic depiction of the cargo stowed aboard ship, prepared jointly by the team embarkation officer and the combat cargo officer. The completed stowage diagram shows the exact location of vehicles and cargo at each deck level for each cargo compartment. Cargo space diagrams in the ship's loading characteristics pamphlet are used as the basis for preparation of stowage diagrams.

a. Preparing Templates. Templates are drawn and cut to scale from heavy paper for each type of vehicle and heavy lift. These templates are usually rectangles, representing length and width, but may conform to the actual outline of the vehicle or heavy lift. The scale is $\frac{1}{8}$ inch to 1 foot. The vehicle templates are marked with unloading priority number in parentheses, unloading serial number, organization, height, gross weight, and type of vehicle. The heavy-lift templates are marked with organization, height, gross weight, and content.

b. Preparing Diagrams. Vehicle templates are fitted into cargo space diagrams according to the planned unloading priority for the vehicles and in consideration of the serial composition. Other templates are then fitted into cargo spaces as desired. When templates have been completed for the entire ship, they are traced on the diagrams and identified. The remaining stowage space to be occupied by standard cargo is indicated and identified. Template tracings of vehicles are identified on the diagram by the unloading priority number (appearing in parentheses) and landing serial number. All other cargo is identified by type of cargo and height.

c. Other Information. Stowage diagrams also contain the following cargo compartment data: cargo space dimensions, location of obstructions, dimensions of overhead opening, minimum



USS VERMILLION (AKA 107)

LOWER HOLD, #1 HOLD

HATCH OPENING OVERHEAD ----- 21' 8" X 19' 9"

WITHOUT ROLLER BEAMS ----- 26' 8" X 19' 9"

BALE CUBIC FEET ----- 16,854

SQUARE FEET ----- 1,593

CLEARANCE TO COAMING ----- 9' 3"

CLEARANCE TO GIRDERS ----- 10' 7"

CLEARANCE TO BOARDS ----- 11' 8"

MINIMUM CLEARANCE ----- 9' 3"

BOOMS ----- TWO 10-TON

NOTES: TWENTY FIVE MINUTES TO REMOVE ROLLER HATCH BEAMS.

HEAVY DOTTED LINES INDICATE HATCH OPENING OVERHEAD WITH ROLLER BEAMS.

LIGHT DOTTED LINES INDICATE HATCH OPENING OVERHEAD WITHOUT ROLLER BEAMS.

NUMBERS (1)-(14) INDICATE UNLOADING PRIORITY NUMBERS.

SCALE: 1/8" = 1'

Figure 11. Stowage diagram (lower hold).

overhead clearance, bale cubic capacity, square feet of deck area, and capacity of booms.

45. Stowage Diagram Manifest (Recapitulation) (fig. 12)

After the stowage diagrams have been completed for each deck level of all holds, a recapitulation of the cargo stowed on each deck level is entered on the Stowage Diagram Manifest (DA Form 2537-R), which will be locally reproduced on 8" x 10½" paper, for each deck level of all holds in which cargo is stowed. The stowage diagram manifest used is a simple form divided into six columns as shown in figure 12. Column content is explained below.

a. Priority (Col. a). Enter the assigned unloading priority number. If no unloading priority number is assigned, leave column blank opposite items concerned.

b. Description (Col. b). Enter a brief description of each item or group of supplies stowed in the compartment; for example, truck, ¼-ton; rations; baggage; etc.

c. Organization (Col. c). Enter the unit to which the supplies and/or equipment are assigned. For items not assigned to a particular troop unit, enter *All*.

d. No Lifts (Col. d). Enter the number of cargo hook cycles required to unload each item of equipment or group of supplies (par. 46).

e. Cu. Ft. (Col. e). Enter the volume (cubic feet) of each vehicle or item of equipment and the volume of all other cargo entered on this form.

f. Gross Wt. (Lbs.) (Col. f). Enter the gross weight of each vehicle or item of equipment. Indicate the gross weight of all other cargo.

46. Profile Loading Diagram (fig. 13)

The team embarkation officer, assisted by the ship combat cargo officer, prepares the profile loading diagram from information in the stowage diagrams. The profile loading diagram is included in the loading plans for transports and cargo ships but not in those for landing ships or submarines. The profile loading diagram is a distorted profile view of the ship showing cargo compartments in which troop cargo is stowed. Figure 13 is a sample profile loading diagram.

a. In each cargo space the number, nomenclature, and gross weight in pounds of each type of vehicle are shown. Unloading

STOWAGE DIAGRAM MANIFEST (FM 60-30)				PAGE NO.	NO. OF PAGES
HOLD NO. 1			HOLD LEVEL L/H		
PRIOR- ITY NO. a	DESCRIPTION b	ORGANIZATION c	NO. LIFTS d	CUBIC FLEET e	GROSS WT. (Pounds) f
1	<i>Trk, Cargo, 1 1/4 T</i>	<i>Co A, 3d Inl Bn</i>	1	927	5175
2	<i>Trk, Cargo, 2 1/4 T, M211</i>	<i>Co A, 3d Inl Bn</i>	1	1646	18580
3	<i>Trk, Water, 1 1/4 T</i>	<i>Co A, 3d Inl Bn</i>	1	706	5615
4	<i>Trk, Cargo, 2 1/4 T, M211</i>	<i>Co A, 3d Inl Bn</i>	1	1646	18580
5	<i>Trk, Cargo, 1 1/4 T</i>	<i>Co B, 3d Inl Bn</i>	1	927	5225
6	<i>Trk, Cargo, 2 1/4 T, M211</i>	<i>Co B, 3d Inl Bn</i>	1	1646	18580
7	<i>Trk, Amph Cgo, 1/4 T</i>	<i>Co A, 3d Inl Bn</i>	1	189	985
8	<i>Trk, Utility, 1/4 T, M38A1</i>	<i>Co A, 3d Inl Bn</i>	1	258	2665
9	<i>Carrier, Lt Wpns, M274</i>	<i>Co A, 3d Inl Bn</i>	1	152	1520
10	<i>Carrier, Lt Wpns, M274</i>	<i>Co B, 3d Inl Bn</i>	1	152	1800
11	<i>Trk, Amph Cgo, 1/4 T</i>	<i>Co A, 3d Inl Bn</i>	1	189	1035
12	<i>Trk, Utility, 1/4 T, M38A1</i>	<i>Co A, 3d Inl Bn</i>	1	258	2665
13	<i>Carrier, Lt Wpns, M274</i>	<i>Co B, 3d Inl Bn</i>	1	144	1730
14	<i>Carrier, Lt Wpns, M274</i>	<i>Co A, 3d Inl Bn</i>	1	150	1650
		TOTALS	(14)	(8990)	(85805)

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(Entries in italics are sample entries only.)

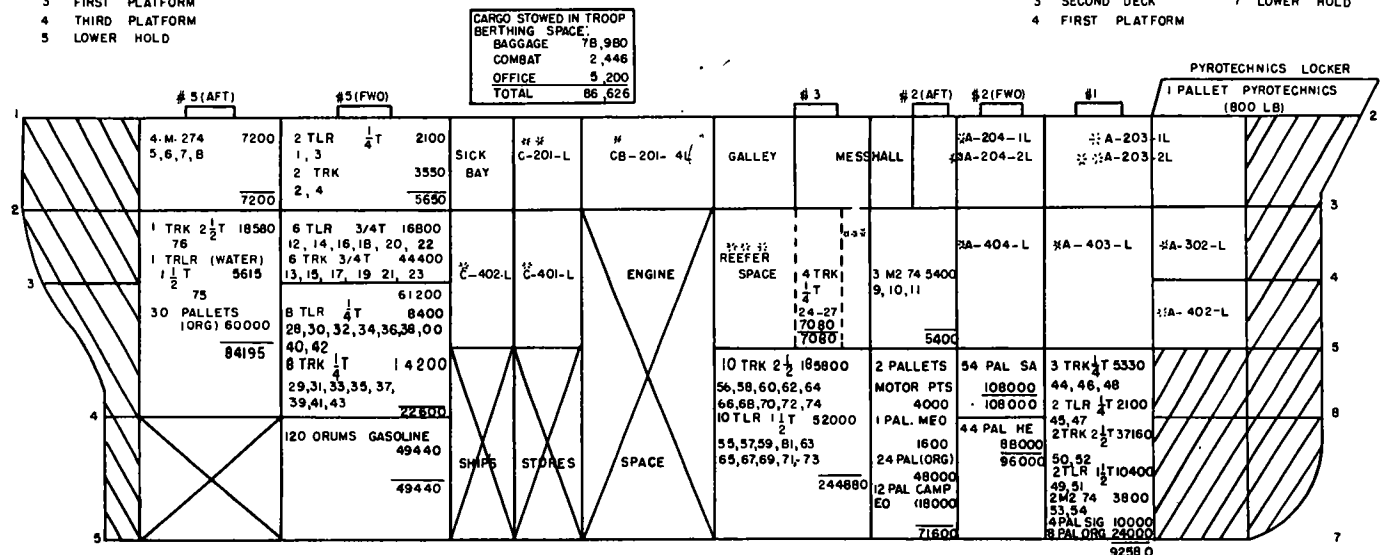
Figure 12. Stowage diagram manifest.

priority numbers are indicated under the nomenclature; these show the relative location of vehicles by priority number. Cargo of the same type in a cargo compartment is combined, indicating the number of lifts, description, and total weight. The weights in each cargo compartment are then totaled.

- 1 MAIN DECK
- 2 SECOND DECK
- 3 FIRST PLATFORM
- 4 THIRD PLATFORM
- 5 LOWER HOLD

U.S.S. FREMONT (APA 44)

- 1 FOC'SLE DECK
- 2 MAIN DECK
- 3 SECOND DECK
- 4 FIRST PLATFORM
- 5 SECOND PLATFORM
- 6 THIRD PLATFORM
- 7 LOWER HOLD



HOLO SECT NO	NO 5 (AFT)	NO 5 (FWD)	BERTHING SPACE	NO 3	NO 2(AFT)	NO 2(FWD)	NO 1	PYROTECHNICS
NUMBER OF LIFTS	38	47	- -	24	42	98	23	
SHORT TONS	45.6	66.6	43.3	1224	38.5	102	47.7	0.4
ESTIMATED UNLOADING TIME (MINUTES)	240	485	- - -	385	270	535	245	--
TOTAL SHORT TONS. 466.5	*OENOTES TROOP ENLISTED BERTHING SPACE **OENOTES TROOP OFFICER BERTHING SPACE ***OENOTES REFRIGERATE CARGO SPACE							

Figure 13. Profile loading diagram.

b. Bulk cargo averages 1 short ton per lift, except ammunition which averages 1½ short tons per lift. Each vehicle, pallet, container, or heavy lift is one lift. The lower portion of the profile loading diagram shows the number of lifts, the number of short tons, and the estimated unloading time in minutes for each hold. In computing unloading time, the following data can be used as a guide:

- (1) For yard-and-stay rig, 5 minutes per lift.
- (2) For swinging-boom rig, 10 minutes per lift.
- (3) For jumbo-boom rig, 15 minutes per lift.
- (4) To open a hatch, 15 minutes.
- (5) To shift rigs, 30 minutes.

c. When unloading time estimates are being prepared for ships such as the LPH and the LPD that are equipped with cargo elevators, vertical pallet conveyors, and overhead monorail crane systems, other factors must be considered. These factors include elevator or conveyor loading times, cycle time, unloading time, time required in positioning cargo for helicopter pickup, helicopter hookup time, and loading and clearing landing craft from loading stations. Until experience factors for this type of shipping can be established, time estimates must be based upon experience gained during loading and rehearsal.

d. Space is provided at the top of the profile loading diagram for listing troop space cargo and pyrotechnics. The weight of these items and the cargo in each hold are totaled and converted to short tons. This total must agree with the grand total in the consolidated unit personnel and tonnage table.

47. Consolidated Vehicle Table

(fig. 14)

The Consolidated Vehicle Table (DA Form 2538-R), which will be locally reproduced on 8" x 10½" paper, prepared by the team embarkation officer, is not part of the loading plan. It is a summary of all vehicles listed on the consolidated vehicle summary and priority table by types of vehicles and organizations to which they belong. The consolidated vehicles table is shown in figure 14. The form is filled in as follows:

a. In the spaces provided under the heading *type of vehicles* at the top of the form, enter the nomenclature for each type of vehicle.

b. On the lines provided under the column *troop unit* along the left-hand margin of the form, enter each organization assigned. Across the page under the appropriate *type of vehicle* column,

CONSOLIDATED VEHICLE TABLE (FM 60-30)						UNIT Team ECHO No. 2						PAGE NO.		NO. OF PAGES	
TROOP UNIT	TYPE OF VEHICLES														
	Tkt, Ammo, 2T, 2W	Tkt, Cargo, 1/4T, 2W	Tkt, Cargo, 1/4T, 2W	Tkt, Cargo, 1/4T, 2W	Tkt, Water Tk, 1/4T, 2W	Tkt, Ambulance, FL, 1/4T, 4x4	Tkt, Cargo, 5T, 6X6, LWB	Tkt, Cargo, 2 1/2T, 6X6, LWB, w/w	Tkt, L Wrecker, 2 1/2T, 6X6, w/w	Tkt, Shop Van, 2 1/2T, 6X6	Tkt, Utility, 1/4T, 4x4	Tkt, Cargo, 1/4T	Tkt, Tank Fuel, 2 1/2T		TOTAL
Hq & Hq 3d Inf Bn	2	24	23	11	4	6	2	14	1	1	39	27	2		156
Co A, 3d Inf Bn		5	2	1				1			5	3			17
Co B, 3d Inf Bn		5	2	1				1			5	3			17
Co C, 3d Inf Bn		5	2	1				1			5	3			17
TOTAL VEHICLES BY TYPE	2	39	29	14	4	6	2	17	1	1	54	36	2		207

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(Entries in italics are sample entries only.)

Figure 14. Consolidated vehicle table.

enter the number of each type of vehicle assigned to each organization.

c. In the block provided on the right-hand margin of the form under the column *total*, enter the total number of vehicles assigned to each organization.

d. On the bottom of the page along the line entitled *total vehicles by type*, enter under the appropriate column heading the total vehicles by type.

SECTION VII

PREPARATION FOR MOVEMENT

48. General

a. In preparing personnel, equipment, and supplies for movement and embarkation, commanders will be guided by AR 220-10.

b. The movement of personnel, supplies, and equipment into and out of the embarkation area must be accomplished on schedule without congestion. From information furnished by the movements section of the mounting agency (par. 69), the embarkation unit commander, in coordination with embarkation and transport group commanders, publishes in the unit embarkation plan an annex entitled "Calendar of Events." This annex consists of a chronological listing of events for executing embarkation; for example:

- (1) Deadline for waterproofing vehicles.
- (2) Deadline for preparing cargo for movement.
- (3) Movement of advance details.
- (4) Movement and assembly of cargo and equipment in the embarkation area.
- (5) Start of cargo loading.
- (6) Completion of cargo loading.
- (7) Movement of personnel.
- (8) Personnel embarkation schedules.

c. To insure that the requirements contained in the calendar of events can be accomplished according to schedule, two important steps must be planned and executed: personnel, equipment, and supplies must be prepared for movement, and the embarkation area must be prepared and organized to receive, store, move, and load personnel, equipment, and supplies.

49. Standardization

The preparation of personnel and cargo for movement to the embarkation area for loading aboard transport is a troop responsibility. The division (group) will issue an embarkation plan (app. II) that will cite regulations, establish guides, and contain special instructions, as required, to effect unification of effort, establish standard methods of processing personnel and equip-

ment, and effect standardization in packaging and marking supplies and equipment.

50. Army Responsibility for Mounting

a. The theater army commander normally assigns to the communications zone the mission of mounting the landing force. When an operation must be mounted from an area in which administrative organizations and facilities are meager, the landing force may be required to assume responsibility for part or all of its own mounting.

b. As soon as possible after the decision has been made to launch an amphibious operation, the mounting agency is designated, and its responsibilities are defined. These responsibilities normally include—

- (1) Provision of facilities for marshaling and embarking the landing force and components of the other services as directed.
- (2) Supply of the landing force before and during the operation, including emergency supply.
- (3) Assistance in preparing supplies and equipment for embarkation and assistance in embarkation.
- (4) Operation of marshaling and embarkation facilities for followup shipping.

51. Preparation of the Embarkation Point

a. After the embarkation team has been assigned an embarkation point within an embarkation area, the team embarkation officer makes a preliminary survey of his assigned point to determine whether facilities are adequate or improvements necessary. Recommendations for improvements are submitted to proper authority immediately so that the improvements can be completed before the arrival of supplies and equipment. Generally, the unit embarkation officer coordinates and supervises the preparation of the embarkation points assigned to the teams within his embarkation organization. Common improvements to consider are—

- (1) Clearing and leveling of cargo assembly area.
- (2) Construction of earth finger ramps for landing craft if loading from a beach embarkation point.
- (3) Construction of embarkation control facilities.
- (4) Establishment of communication facilities.

b. After improvements to the embarkation point have been completed, the team embarkation officer moves his advance party to the embarkation point to prepare it to receive supplies and

equipment. The advance party divides the embarkation team's assigned cargo assembly area into sections corresponding to the team's assigned ship's holds and deck levels. The layout of the cargo assembly area must allow for simultaneous movement of cargo to all cargo hatches without congestion. Low-priority cargo destined for the lower holds is placed nearest the ship's berth or assigned beach. When the layout of the cargo assembly area has been properly arranged to meet loading requirements, hold and deck levels are marked, and all control personnel supervising the movement of cargo into the cargo assembly area are given detailed instructions concerning the assembly area layout and the ship's stowage plan pertaining to their particular area of responsibility.

52. Principles of Packing and Crating

a. In preparing cargo for embarkation, the following packing and crating principles should be followed:

- (1) Maintain standard uniformity, as far as possible, in box, crate, and pallet sizes to facilitate stowage and handling of cargo and preparation of loading plans.
- (2) Pack and crate different types of supplies separately so far as possible; for example, ordnance, signal, engineer, etc. Only related items are packed in the same container.
- (3) When applicable, and insofar as possible, balance proportions of items within containers.
- (4) Pad and strengthen containers to insure protection of fragile items.
- (5) Waterproof containers whose contents are subject to moisture damage.
- (6) Apply a rust preventive or a preservative to items requiring protection.

b. For specific instruction pertaining to crating, packing, waterproofing, and application of preservatives, see TM 38-230 and SB 38-100.

53. Marking Supplies

a. *General.* Proper marking provides identification of crated or boxed supplies and speeds preparation of loading plans. Sample markings are illustrated in appendix VI. Supplies must have the following markings:

- (1) *Content marking.* Content markings identify the container in two ways:
 - (a) *Box number.* The box number is assigned by the or-

ganization to which the box is assigned. The box number is recorded in the unit cargo manifest.

- (b) *Service designator.* Division supplies are identified by service designators (Federal Specification TT-C-595) to assist in determining dump destination during unloading and handling ashore.
- (2) *Stowage designator.* Unit supplies are marked with a 3-inch disk. All supplies except those required en route are marked with a white disk; those required en route are marked with a yellow disk. Components of sets packed in two or more containers may be marked with an additional 2-inch red disk.
- (3) *Cube and weight.* The volume in cubic feet and the weight in pounds are inscribed on each container.
- (4) *Administrative markings.* In some instances administrative markings are required by organizational SOP. These may be added to or combined with those required for amphibious loading purposes.
- (5) *Tactical markings.* Tactical markings are not used except when authorized and applied under provisions of AR 220-10.

b. *Special Markings.*

- (1) Future amphibious embarkations may be conducted over a large area. Landing force units will be embarked at dispersed port facilities when feasible or over the beach to prevent prohibitive concentrations. When embarkation teams are embarked at dispersed points, there is a requirement for simple and accurate markings on equipment and supplies, in addition to those markings required by AR 220-10. These special markings are used only for delivery to the embarkation area and for loading aboard ship. Special markings recommended for use are as follows:
 - (a) *Embarkation organization.* Each package, pallet, and vehicle delivered to the embarkation point within the embarkation area should be marked with the embarkation organization designation. This marking used in conjunction with pile tags (par. 78c) will assure delivery to the proper embarkation point. Embarkation organizations are designated by Roman numerals from group; phonetic combinations of letters for unit; and numbers for teams. Thus the designation IV Bravo 4 would designate Embarkation Group IV, Embarkation Unit Bravo, Embarkation Team 4. The

marking for the cargo of this embarkation organization would be IV-B-4.

- (b) *Color markings.* The markings placed on equipment to designate hold, deck level, and priority number are placed on the equipment in grease pencil or chalk. To insure that the cargo is loaded in the proper hold, these markings may be written on the equipment in the color assigned to hatches in naval standing operating procedures. Standard colors assigned hatches are as follows:

Hatch #1-----	Red
Hatch #2-----	White
Hatch #3-----	Blue
Hatch #4-----	Yellow
Hatch #5-----	Green

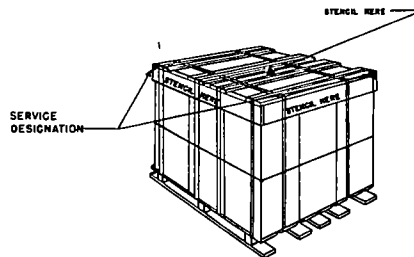
- (2) Special markings are not limited to those discussed above. Any marking that will assist organizations in identifying packages and their contents without violating security regulations may be employed so long as uniformity of markings is maintained.

c. Marking Palletized Unit Loads.

- (1) The standard methods of marking palletized unit loads are contained in Military Standard 129A. These standard markings are suitable for use when no security classification is involved in the movement of a military force.
- (2) For the purpose of amphibious embarkation, it is assumed that the marking of equipment and supplies will require security measures that preclude use of any markings other than contents, weight, cube, shipment number, package, number, and service designator. These markings may be placed on the palletized unit in one of three ways: on the packages loaded on the pallet, on the collars or frames of a crated type pallet, or on metal tags which are attached to the metal bands that secure the load to the pallet. These methods of marking are depicted in figure 15.
- (3) When desirable, special markings that may assist in delivery to the proper embarkation point and ship's hold (b above) may be used in addition to the markings indicated in figure 15.

54. Preparation of Vehicles for Embarkation

a. Instructions for preparing vehicles for embarkation vary with the type of vehicle. These instructions will normally be

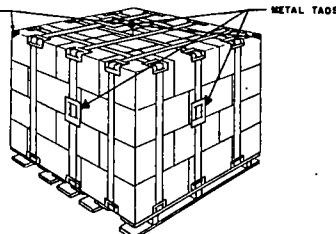


METHOD B - MARKING PALLETIZED UNIT LOADS WHICH HAVE WOOD COLLARS OR FRAMES (FIREBRICK, METAL DRUMS, ETC.). STENCIL THE REQUIRED MARKINGS ON TWO ADJACENT SIDES AND THE TOP OF THE COLLAR OR FRAME IN THE LARGEST LETTERS COMMENSURATE TO THE WOOD AREA AVAILABLE FOR STENCILING.

- A. CONTENT MARKING
(EXAMPLE: RATIONS, COMBAT)
- B. WEIGHT AND CUBE
(EXAMPLE: 2500 LBS B4 CUFT)

- C. SHIPMENT AND PACKAGE NUMBERS
(EXAMPLE: (12345)(PALLET #4 OF 5))
- D. SERVICE DESIGNATION
(EXAMPLE: WILLOW GREEN---OM)

SERVICE DESIGNATION _____ METAL TAGS _____



METHOD C- ALTERNATE METHOD FOR MARKING ANY UNIT LOAD. WHEN THE LOAD IS BEING STRAPPED, THREAD THE STRAPS THROUGH SLOTTED METAL ENCLOSED MARKING TABS AT LEAST 5"x6-1/2" ON TWO ADJACENT SIDES AND THE TOP OF THE UNIT LOAD. THREAD THE TAB ON THE TOP OF THE UNIT LOAD ON A STRAP WHICH DOES NOT CONTAIN A SIDE MARKING TAB. SECURE THE TABS AT THE CENTER OF THE LOAD BY MEANS OF A TWISTED WIRE OR OTHER SUITABLE METHOD.

Figure 15. Methods for marking palletized unit load (classified movement).

included in the embarkation plan. The following instructions are always included:

- (1) Fill fuel tanks to three-fourths capacity. A reserve supply of packaged POL is placed in the vehicle.
- (2) Check fuel, ignition, lubrication, and cooling systems and inflate tires to specified pressure.
- (3) Install waterproofing kits in vehicles to be landed across the beach. Waterproof vehicles for which waterproofing kits are not available in accordance with TM 9-238.
- (4) Remove cargo compartment bows, secure together, and attach to the body of the vehicle. Fold canvas tops and place in the vehicle.
- (5) Lower and crate windshields.
- (6) Establish load weights and dimension limits for various types of vehicles with instructions for spotting and lashing the combat load.
- (7) Mark vehicles on each side and on top indicating the ship's hull number, hold, deck level in which the vehicle is to be stowed, and the vehicle unloading priority number. Other information pertinent to embarking may be inscribed. Markings are made with grease pencil, chalk, or other easily removable substance.

b. Vehicles must be loaded in the reverse order of the priority for discharge listed in the vehicle summary and priority table. Vehicles will be stowed fore and aft and blocked and lashed to prevent shifting during transit. Drivers and assistants, when available, will be embarked in the same ship with their assigned vehicle.

c. During the voyage drivers and their assistants should be given a special briefing, if necessary, on the planned use of their vehicle and its contents. Vehicles should be inspected frequently to insure that they will function properly when unloaded at the objective. Arrangements can be made with the ship combat cargo officer for access to hatches for inspections and for correction of deficiencies noted. Items that frequently require corrective measures are vehicle waterproofing, fuel or lubricant leaks, blocking and lashing for vehicle security, moisture damage, tire inflation or damage, and battery charge and water level.

55. Reserve Supplies

For an amphibious operation, reserve supplies of all classes are divided into categories to simplify embarkation and debarkation and to provide the initial supply for units landing on separate

beaches. Each category is planned and loaded as a separate entity, but the situation upon landing may result in the simultaneous unloading of several categories. Categories are classified as individual reserves, assault echelon reserves, and landing force reserves. These do not include the basic loads carried by individuals, with crew-served weapons, or on vehicles; such supplies are used to initiate combat and are not part of the reserves. For detailed information pertaining to reserve supplies, see FM 31-12.)

56. Class I Supplies

a. Assault and field rations are normally prescribed for an amphibious assault. Individual reserves, generally one or two rations, are carried by each soldier. Each assault landing team loads reserve rations for 1 or 2 days on unit transportation.

b. All personnel embark and debark with filled canteens. Normally, each soldier is issued two canteens. All 5-gallon water cans are taken ashore filled. The commanding officer of the ship is responsible for supplying water to the embarkation team en route to the objective and for the initial supply of water ashore until local sources on land are available. If water is not available ashore, empty water cans may be returned to the transport for refilling or may be refilled from tanks installed in landing craft. A troop transport can normally furnish 2 gallons of water per passenger per day for the number of personnel it is rated to transport.

c. Items such as salt tablets, malarial suppression tablets, insect repellents, and motion (seasick) pills are distributed with class I supplies to simplify issue. Instructions for their use may be included in the embarkation order published by the embarkation unit.

d. Planning data pertaining to class I supplies are contained in appendix IV.

57. Class II Supplies

Class II supplies to be carried by the landing force are listed in the embarkation orders published at embarkation group and unit levels. Assault echelon reserve supplies are loaded in assault shipping. Depending on availability of shipping space, a portion of the supplies are loaded in shipping allocated to each assault landing team. Clothing may be bundled by sizes and waterproofed. Weapons and equipment included in assault echelon reserve are maintained in combat-ready condition and may be loaded by type. Class II reserve supplies are normally landed and delivered to

assault units after the assault to replace lost and damaged supplies.

58. Class III Supplies

a. The embarkation plan of the embarkation group and/or unit provides for the embarkation of vehicles committed to the assault or in combat reserve with gasoline tanks filled to 75 percent capacity and crankcases filled with oil. In addition, lubricants in issue containers and 5-gallon cans of gasoline and lubricating oil accompany each vehicle. Spare cans are stowed and secured in the body or cab of the vehicle in such a manner as to prevent damaging or spilling the contents of the can during loading and unloading. Spilled fuels and lubricants are always fire hazards, and aboard ship in the vicinity of combat-loaded vehicles, they could lead to disaster.

b. Planning data pertaining to class III supplies are contained in appendix IV.

59. Class IV Supplies

a. For the assault landing team, class IV supplies usually consist of engineer and medical items required for the assault. Class IV engineer equipment required for an amphibious operation is normally prescribed by higher commanders and listed in the embarkation plan of the embarkation group and/or unit. These supplies are landed with the landing team shore party or attached engineer units.

b. Most medical supplies are carried ashore by the attached medical units. Medical supplies to be taken ashore in the assault are prescribed by type and quantity in the embarkation plan published by the embarkation unit. This plan also provides for emergency medical supplies to be delivered on call.

60. Class V Supplies

a. Class V supplies include ammunition, explosives, and pyrotechnics required in the assault. They are stowed aboard ship in a manner that permits unloading by type and quantity and in the order desired. Ammunition to be issued to each man and each weapons crew just before debarkation is placed in an accessible hold or locker aboard ship.

b. The initial ammunition supply consists of the following:

- (1) The ammunition aboard the transport includes bulk or unitized packages of ammunition that are available on call.

- (2) The ammunition loaded in landing craft and amphibians assigned to floating dumps constitutes the emergency reserve. Delivery time to using units is dependent upon the speed of the carrier and the distance to the user.
- (3) The ammunition loaded in organizational vehicles constitutes a mobile reserve. These vehicles normally will not be landed until space secured ashore is adequate for movement and dispersion.

c. Planning data pertaining to class V supplies are contained in appendix IV. Reserve ammunition supplies are discussed in FM 31-12 and FM 31-13.

61. Palletization

a. *General.* Pallets are employed in cargo operations to speed the rate of transferring cargo from one method of transport to another. In amphibious operations, the employment of pallets to make up palletized unit loads results in rapid and sustained delivery of supplies to landing force assault units.

b. *Types of Pallets.* There are numerous types of pallets in use and under development. For the purpose of this manual, discussion is limited to four common types: stevedore, sled, general-purpose, and warehouse pallets.

- (1) *Stevedore pallet.* The stevedore pallet is a heavy-duty pallet 6 feet long, 4 feet wide, and 8 inches high. It is used principally to transfer loose cargo from one mode of transport to another. It is the most common type of pallet used by stevedores in terminal cargo operations. It is moved within the port complex by forklift and is lifted aboard ships by the ship's cargo gear. When the pallet with cargo loaded upon it is landed in the ship's hold, the cargo is removed and stowed and the empty pallet returned to the pier. This type of pallet is employed extensively in commercial loading.
- (2) *Sled pallet (fig. 16).* The sled pallet is a 4- by 6-foot timbered platform mounted on runners. Supplies and equipment are secured to the pallet with steel bands. Cables are attached to the runners, forming a bridle for towing. The sled pallet can be handled by forklift and ship's gear and can be towed through surf and over most beaches suitable for amphibious assault. Under most conditions the loaded sled pallet can be towed directly to inland dumps. Rations, water, ammunition, field fortification supplies, and fuel in 5-gallon cans are suitable for loading on sled pallets. Supplies subject to salt-water

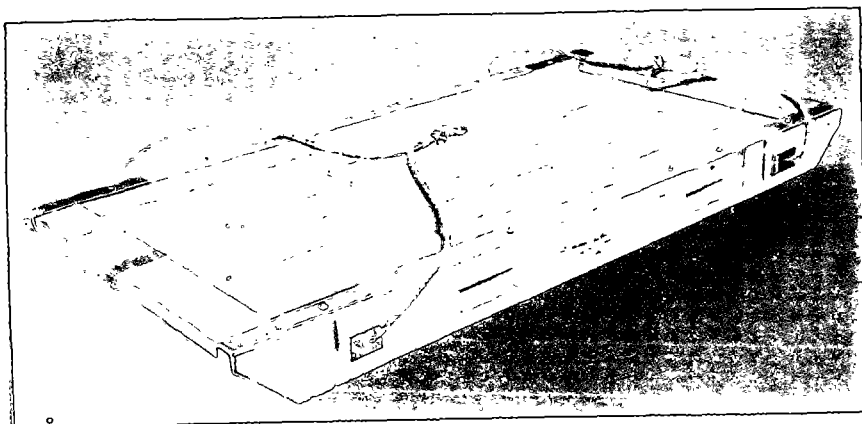


Figure 16. Sled pallet.

deterioration are waterproofed. The normal load for the sled pallet is 2,000 pounds; the maximum load, 3,000 pounds.

(3) *General-purpose pallet* (fig. 17).

- (a) The general-purpose pallet is a four-way entry, wooden pallet for delivery of palletized unit loads by surface and/or aerial means in the ship-to-shore movement. The general-purpose pallet is constructed so as to facilitate movement by forklift within the cargo spaces of a ship. Forklifts can lift this type of pallet from either side or either end, whereas other types of pallets can be lifted by forklift from the sides only. The four-way entry simplifies stowage and discharge procedures. When this pallet is employed to make up a palletized unit load, the load and the pallet are bound together by longitudinal and transverse metal strapping.

(b) Empty and loaded specifications are as follows:

	Empty	Loaded
Length.....	48 inches	52 inches
Height.....	5¼ inches	54 inches
Width.....	40 inches	43 inches
Weight.....	100 pounds	3,000 pounds (gross)
Stowage/Factor.....	-----	52

- (4) *Warehouse pallet.* The warehouse pallet is a lightweight 4- by 4-foot wooden platform used primarily for storing and stacking cargo in the embarkation area. Uniform drafts can be piled four or five high, thus reducing stor-

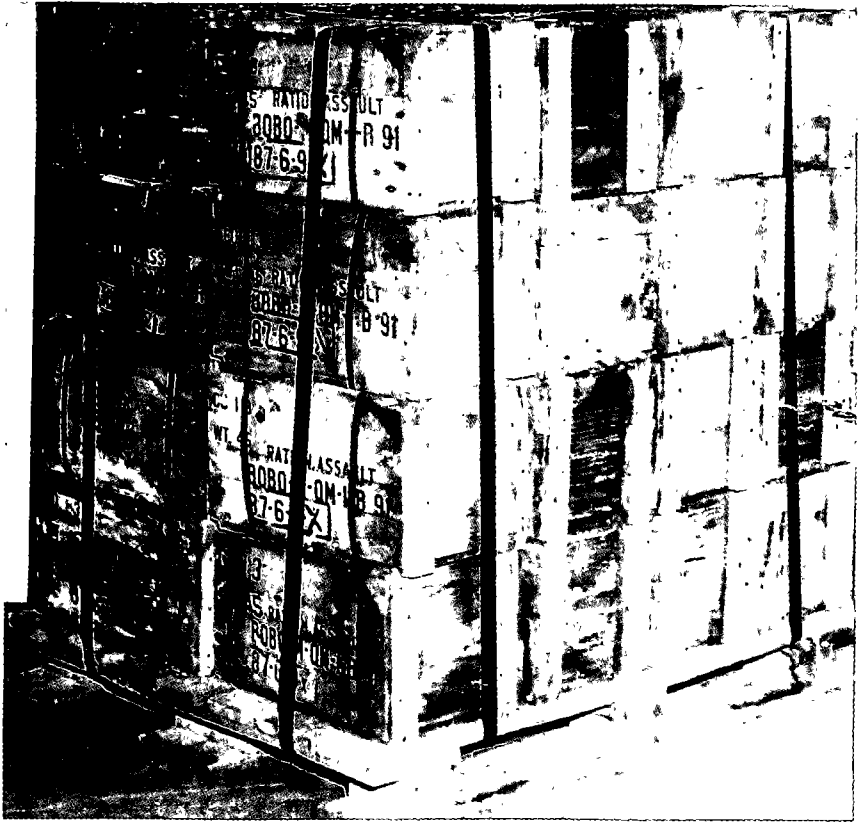


Figure 17. General-purpose pallet, loaded and banded.

age space requirements. Labor requirements are reduced since the warehouse pallet can be handled by forklift. The warehouse pallet may be used as a substitute for the general-purpose pallet in making up palletized unit loads, but two limiting factors must be considered: Load limitation and two-way entry. The maximum load placed on the warehouse pallet, when used to make up a palletized unit load, should not exceed 2,000 pounds. The two-way entry limits the use of forklift since the forks can be used from sides only; accordingly, one side of the pallet must face the square of the hatch when stowed in a ship's hold.

c. Palletized Unit Load.

- (1) A palletized unit load may be a container or a number

of containers placed on a base, which may be a pallet, a skid platform, or runners, and secured thereto for the purpose of shipping the container(s) and base as a unit. The term *palletized unit load* as used in this manual refers to the loaded, general-purpose, four-way-entry, wing-end, wooden pallet (a(3) above).

- (2) The use of palletized unit loads facilitates rapid delivery of supplies to assault forces and allows the tactical commander flexibility in the mode of transport employed to effect delivery. Tactical commanders may employ the mode of transport that best supports their requirements: aircraft, landing craft, amphibious vehicles, or landing ships. The same type of pallets may be delivered by landing craft and landing ship to the waterline, by amphibious vehicles to units several miles from the waterline, or by aircraft to units within their range and load capabilities.
- (3) Speedy transfer from one mode of transport to another will be sustained only if adequate and suitable materials-handling equipment is available at each transfer point. Transfer points employed in amphibious operations are described below:
 - (a) *Ship*. When stowing and discharging palletized unit loads in the ship's hold, it will be necessary to have materials-handling equipment available in the hold. This equipment is used to move the draft from the square of the hatch to the wings of the hold when loading and from the wings to the square of the hatch when discharging.
 - (b) *Waterline*. When landing craft or landing ships are employed to deliver palletized unit loads to the beach, prohibitive beach congestion will occur, unless materials-handling equipment for rapid discharge of these vessels is available at the shoreline. The equipment required at the shoreline includes rough-terrain forklifts, mobile and/or crawler cranes, and vehicles that can be loaded with palletized units and moved out of the beach area, loaded, under their own power. The materials-handling equipment necessary for continuous supply flow over the beach is organic to units normally included in the shore party.
 - (c) *Dump*. Regardless of the transport mode employed in the movement of supplies ashore to support an amphibious operation, supply points (dumps) will nor-

mally be established to effect distribution to using units. These dumps must have suitable materials-handling equipment available to move palletized unit loads in the dump area. If adequate materials-handling equipment is not available in the landing zone to support a helicopter operation, plans should provide for direct delivery to using units by helicopter or for adequate personnel to break down pallets and effect distribution at the landing site.

- (4) Known requirements, such as class I, III, and V supplies, may be prepackaged in palletized unit loads for delivery directly to using units. During the assault, these unitized supplies may be delivered directly to using units by surface and/or air transport, dependent upon requirements and availability of transport.

d. Reference. Technical guidance for the preparation of unitized loads is contained in TM 743-200.

62. Containerization

a. General. Containers (cargo transporters) are now being used by all services to transport cargo from the continental United States to oversea destinations. The use of containers permits rapid handling when transfer from one transport mode to another is required. As with palletized unit loads, the successful employment of cargo transporters in an amphibious operation is dependent upon the availability of adequate and suitable materials-handling equipment in the embarkation area, aboard ship, and at the delivery site within the objective area.

b. Advantages of Containerization.

- (1) The movement of supplies and equipment in cargo transporters permits standardized operations from origin to destination and rapid transfers between transport modes.
- (2) Requirements for packaging and packing of supplies may be reduced when shipments are made in cargo transporters. Since the transporters provide protection during movement, in-transit storage, and temporary storage in the embarkation and objective areas, shipping damage and risk of loss from pilferage are reduced and integrity of lots, sets, or "married packages" can be maintained. In a nuclear situation, these containers may serve to protect supplies from fallout contamination.
- (3) Checking of shipments and documents at all points en route and sorting and distribution of supplies at destination are simplified.

c. *Cargo Transporter* (fig. 18).

(1) Cargo transporters are constructed of steel. Access is by means of a double door across one end. Each transporter is skid mounted and fitted with lifting lugs located at the four top corners. Weight, bulk, and construction of cargo transporters require that they be handled, stored, and transported top-side-up; because of this, bracing and dunnage requirements are minimum. Horizontal steel bands welded to the interior side and rear panels provide a means of lashing cargo. Each transporter is identified by a serial number stenciled on all four sides. Four address plates are provided for identification of weight, cube, and consignee.

(2) There are two types of cargo transporters: type 1 and type 2. Type 1 has a bale capacity of 135 cubic feet; type 2, 295 cubic feet. Each type has a weight capacity of 9,000 pounds of cargo. Type 1 is intended to carry cargoes having densities exceeding 45 pounds per cubic foot. This type may also be used for shipping cargo of lighter density when type 2 transporters are not available. Type 2 is intended to carry cargoes having densities between 30 and 45 pounds per cubic foot. ~~For detailed information concerning characteristics and use of these containers, see AR 55-166.~~

63. Preparing Personnel for Embarkation

a. Commanders responsible for marshaling in preparation for embarkation must assure that personnel are POR qualified and that organizational property and supply activities have been completed as much as possible before the organization arrives at the embarkation area. The employment of the sea echelon concept in embarkation (par. 3) will preclude holding embarkation organizations in the embarkation area for extended periods of time. Principal planning activities for the movement of personnel to the embarkation area are as follows:

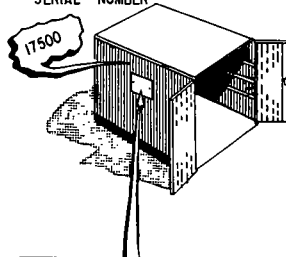
- (1) Selecting and moving advance party (par. 67).
- (2) Planning the movement to the embarkation point.
- (3) Preparing troop space cargo such as duffle bags, office equipment, and communications equipment for movement to the embarkation point.
- (4) Editing and correcting team embarkation rosters.

b. The embarkation team receives orders from the embarkation unit commander directing its movement to the embarkation point.

U S ARMY-US AIR FORCE

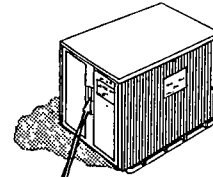
BOX, METAL, SHIPPING, REUSABLE (CARGO TRANSPORTER), IN CONEX SERVICE

IDENTIFICATION
EACH TRANSPORTER IS IDENTIFIED BY A
SERIAL NUMBER



ESSENTIAL MARKINGS MUST APPEAR ON EACH
ADDRESS PLATE ON ALL FOUR SIDES OF THE
TRANSPORTER.

	TYPE 1 (HALF SIZE)	TYPE 2 (STANDARD)
INSIDE		
LENGTH	5'-10 5/8"	6'-1 5/8"
WIDTH	5'-10 5/8"	6'-11 3/4"
HEIGHT	5'-10 5/8"	6'-0 3/4"
OUTSIDE		
LENGTH	4'-3"	6'-8"
WIDTH	6'-3"	6'-3"
HEIGHT	6'-10 1/2"	6'-10 1/2"
CARGO CAPACITY	9000 LBS	9000 LBS
MAXIMUM TARE WT	900 LBS	1500 LBS
BALE CAPACITY	135 CU FT	295 CU FT
GROSS CUBE	184 CU FT	365 CU FT
GROSS M/T	4 6	5 1



PROPER SECURITY

THE APPLICATION OF NUMBERED SEALS
ALONE DOES NOT PROVIDE ANY SECURITY
AGAINST PILFERAGE.

RUPTURED SEALS ARE MERELY AN
INDICATION OF A BREACH OF SECURITY.

STOUT WIRE "O" TO "3" GAUGE,
TIGHTLY TWISTED & SNUBBED OFF
CLOSELY, WILL PREVENT MOVEMENT
OF THE HANDLE AND DETER THE
WOULD-BE PILFERER.

LOCKS, WIRE CLOSURES, AND SEALS
WILL NOT PREVENT DETERMINED,
ORGANIZED THEFT.

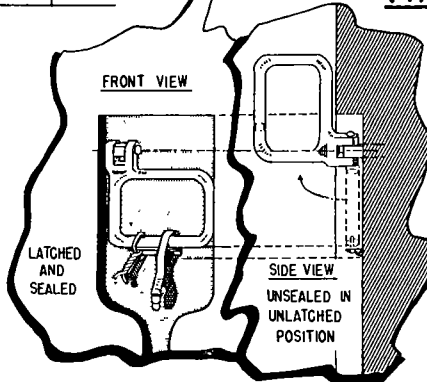


Figure 18. Cargo transporter.

c. Plans are made for the rapid assembly of troop space cargo so that it will precede the embarkation team to the embarkation point.

64. Planning for Embarkation of Personnel

a. The movement section of the mounting agency (par. 69), in coordination with the appropriate embarkation organization and transport organization commanders, prepares a schedule of troop movements to the embarkation area. When possible, the arrival of the first embarking troop organization coincides with the completion of cargo loading.

b. The manner in which personnel are embarked affects the efficiency of debarkation at the objective. The embarkation plan must give consideration to priority for debarkation and the tactical grouping of personnel as dictated by the landing plan. The embarkation plan provides for rapid and orderly debarkation of troops for landing and entry into combat, control of personnel during the operation, simple and effective administration during the voyage, and the comfort of the embarked troops during the voyage.

65. Embarkation Conferences

Before personnel are moved into the assigned embarkation area(s), embarkation conferences are held at group, unit, and team levels, beginning at group level and proceeding down to team/transport level. Decisions reached at the higher levels are passed to lower levels for implementation. At all conferences the landing force, the naval force, and the external (supporting) agency are represented. Determinations made at the team/transport conference are: implementation of movement (landing force) and assembly (naval) directives, composition of the advance party, advance party duties, and date and time advance party boards ship.

66. Troop Compartment Inspection

Before troops are embarked, a representative of the embarkation team commander (usually the team embarkation officer or his assistant), accompanied by a representative of the commanding officer of the ship (usually the ship's first lieutenant or combat cargo officer), inspects the troop compartments of the ship. This inspection normally includes berthing spaces, heads (latrines), mess facilities, and staterooms. Deficiencies are called to the attention of the ship's representative. A written report of such deficiencies and action taken to remedy them is submitted to the commanding officer of troops upon his arrival aboard.

67. Advance Party

The advance party is supervised by the embarkation team executive officer. The advance party includes the following details: ship's platoon, billeting mess, police and sanitation, communications, guard, and administration. Embarkation of the advance party, with the exception of the ship's platoon, is normally accomplished 24 hours before the main body of troops arrives. The advance party completes all preparations for embarking the remainder of the embarkation team. Upon completion of embarkation, advance party personnel continue to function under the control of the commanding officer of troops (par. 15). Before embarkation, advance party personnel are involved in planning, but once aboard ship planning activities are superseded by the requirement to supervise the activities within their respective spheres of responsibility.

a. Ship's Platoon. The ship's platoon begins functioning upon assignment of an embarkation point to an embarkation team. The ship's platoon is the work detail furnished to the team embarkation officer by the embarkation team commander for assistance in loading the ship in the embarkation area and unloading the ship in the objective area. The ship's platoon begins operations in the embarkation area several days to a week before arrival of the main body of the advance party. The main body of the advance party arrives in the embarkation area approximately 24 hours before the ship's platoon completes its loading mission. When loading is accomplished by external agencies, members of the ship's platoon are stationed in the cargo compartments to observe and check the method of loading, since they will be required to unload the same cargo at the objective area. The size of the ship's platoon varies with the type and class of ship, the number of cargo compartments to be loaded, the type of cargo to be handled, the size of the cargo compartments, and the loading and unloading schedule. For example, 2 officers and 60 enlisted men may be required for an APA, whereas 2 officers and 100 enlisted men may be required for an AKA. The number of men necessary to handle the cargo in a cargo compartment varies with the type of cargo stowed at each deck level. The platoon leader must shift men between holds as the labor requirement increases or decreases. For example, cargo compartments in which vehicles are stowed will require approximately one-fifth the labor required in a cargo compartment in which ammunition is stowed. The ship's platoon includes noncommissioned officers to supervise hatch details and hatch checkers who must keep an accurate record of the supplies and equipment loaded and unloaded. Before the ship is loaded,

members of the ship's platoon must receive training in cargo handling and stowage methods; operation of materials-handling equipment; and, if assigned to an airmobile force, aircraft loading.

b. Troop Billeting.

- (1) The billeting officer and his assistants coordinate their activities with the embarkation team commander and the ship's first lieutenant. The billeting officer counts the bunks in each troop compartment to assure that the number of bunks available conforms to the ship's loading characteristics pamphlet. If the bunks in each compartment are not numbered, members of the billeting detail will number each bunk before the main body arrives.
- (2) Each special detail, such as the ship's platoon, mess detail, or guard, is billeted in a separate compartment or in a specific area of one troop compartment.
- (3) The embarkation team commander decides whether the embarkation team will billet tactically or administratively. The billeting officer then prepares the billeting plan and assigns bunks to troop units according to the troop space diagrams contained in the ship's loading characteristics pamphlet.
 - (a) *Tactical billeting.* In tactical billeting, troops scheduled to debark first are billeted in the upper troop compartments, and troops scheduled to debark last are billeted in the lower troop compartments. This reduces confusion during debarkation but makes troop administration during the voyage difficult, as it may not be possible to maintain unit integrity.
 - (b) *Administrative billeting.* In administrative billeting, troop units are kept intact. Each unit is assigned a block of bunks or an entire billeting compartment. If troops are to remain on board for a protracted period or if they are not making an assault landing, administrative billeting is desirable. In an assault phase, this system makes the assembly of troops for loading into assault craft difficult. Troop assembly and coordination are difficult when debarkation schedules require that troops be moved through occupied troop compartments to their debarkation stations.
 - (c) *Tactical and administrative billeting.* Various combinations of tactical and administrative billeting may be used to meet a particular tactical and/or administrative requirement. Thus, administrative unity may

be maintained at platoon level with platoons billeted so that the majority of the troops are nearest their debarkation stations. This would require designation of boat team assembly areas located in appropriate billeting compartments. Before debarkation begins, boat team members must be ordered to report to their assigned boat team assembly areas to be mustered by the boat team commander.

c. Troop Mess. The embarkation team mess officer plans and coordinates the feeding of troops. He coordinates his plans with the ship's first lieutenant and the ship's mess officer. When the plans have been coordinated and approved, the team mess officer submits the following data to the embarkation team commander for publication:

- (1) Meal hours and control procedures for feeding troops.
- (2) Diagram of the location of the mess lines with control points indicated.
- (3) Daily requirements for details to support the troop mess, including cooks and KP and control personnel.

d. Police. The police officer is responsible for the police and sanitation of all ship's space occupied or used by the embarked troops. The ship's first lieutenant briefs the police officer concerning the areas that are troop responsibility for police and sanitation, the location and source of cleaning gear, and schedule of ship's inspections. The police officer assigns police and sanitation areas of responsibility to the various troop units and advises the commanding officer of troops of the daily requirements for details to clean areas used by all troops.

e. Communications.

- (1) During embarkation, the embarkation organization communication officers are normally responsible for communications among embarkation organizations in the embarkation area and jointly responsible with the ship's communications officers for communications among naval and landing force units aboard ship. When an external agency is assigned the responsibility of maintaining communications during embarkation, the embarkation organization communication officers act as liaison officers with responsibilities limited to coordinating communications organization and operations, as required.
- (2) Communications requirements during embarkation normally include radio, telephone, and runners. Normal requirements within the embarkation area are as follows:

- (a) *Embarkation control center (group)*. The embarkation control center, operated by the embarkation group, maintains communications with subordinate embarkation units and the Navy transport group assigned to transport the embarkation group.
- (b) *Embarkation control offices (units)*. Each embarkation unit will operate embarkation control offices that will maintain communications with the embarkation control center (group) and embarkation control points (teams).
- (c) *Embarkation control point (team)*. Each embarkation team will operate an embarkation control point which will maintain communications with the team cargo assembly area, the team's assigned ship, and the embarkation unit control office to which the team is assigned.
- (3) Aboard ship the embarkation team establishes a message center with messenger service to maintain communications between organizations assigned to the embarkation team.
- (4) The embarkation team communications officer plans and coordinates with the ship's communications officer for communication service, which may include the following:
 - (a) Requirement for the Navy to maintain communication guard for embarked troop commands.
 - (b) Assistance required by the Navy from embarked communications personnel to maintain troop communication guard and to conduct normal traffic.
 - (c) Requirement for testing and repair of team signal equipment.
 - (d) Troop use of ship's internal telephone system.
 - (e) Installation of a field telephone system for troop use to supplement the ship's telephone system.

f. Guard. The embarkation team will normally be required to furnish personnel to guard supplies and equipment at the embarkation point and man guard posts to insure security and safety aboard ship.

- (1) When supplies and equipment have been delivered to the embarkation point and when loading has begun, the embarkation team becomes responsible for security. Before the arrival of the main body of troops at the embarkation point, the external agency responsible for the operation of the mounting area is normally respon-

sible for cargo security. To eliminate the possibility of pilferage and sabotage, the special orders to all guards must include instructions to preclude access of unauthorized personnel to cargo assembly areas.

- (2) Aboard ship the number and location of guard posts are determined by the ship's captain. For the first 24 hours the guard personnel are furnished by the advance party. Upon arrival of the main body of troops, the advance party is normally relieved of guard duty.
 - (a) The guard officer is provided with copies of the ship regulations and special orders for the various guard posts. A copy of the special guard orders is provided for each guard post by the ship combat cargo officer.
 - (b) During an amphibious operation, the uniform of all troops is fatigue. To distinguish guard personnel from other duty soldiers, it is necessary that they wear arm brassards, which are furnished by the embarkation team.

g. Administrative Facilities. During embarkation planning, the team embarkation officer arranges through the combat cargo officer for office space and desks and the use of stencil equipment and other facilities. Ships normally provide office space, but if none exists, office space may have to be located in passageways, on hatch covers below the main deck, or in staterooms. In addition to a troop administrative office, space is required for a guard office, and a message center, and for handling and storing classified matter. Space may also be required for planning and conferences.

SECTION VIII

LOADING AND EMBARKING

68. General

a. Embarkation planning and the preparation of personnel, equipment, and supplies for embarkation to conduct an amphibious operation are expensive in terms of time. However, the efficiency of embarkation is usually directly proportional to the time and effort spent in developing the plan and preparing for its execution. A well-developed plan may reduce the time required for embarkation. Staff officers responsible for embarkation must insure that embarkation is executed on schedule in accordance with plans.

b. All embarkation preparations are basically designed to unload and transfer the landing force to designated beaches and/or landing zones in the objective area in the order and at the rate of buildup required to support the tactical plan.

69. Movement Control

a. *Movement Section.* The mounting agency headquarters movement section, or a special section established for the purpose, coordinates and controls movement of all transportation used in the mounting. The movement section usually has authority to establish traffic control, issue movement orders to units concerned, and control transportation used in mounting. With this authority, the movement section of the mounting agency coordinates and schedules the movement of personnel, supplies, and equipment from posts, camps, and stations to the mounting area. When personnel, supplies, and equipment have been organized and prepared for embarkation and loading, the movement section coordinates and schedules the movement of the force to the embarkation area.

b. *Embarkation Group Control Organization* (fig. 19).

- (1) The embarkation group establishes an embarkation control organization to operate within the embarkation area. This organization consists of an embarkation control center (group), embarkation control offices (units), and embarkation control points (teams). The embarkation team control points are located near the head of their

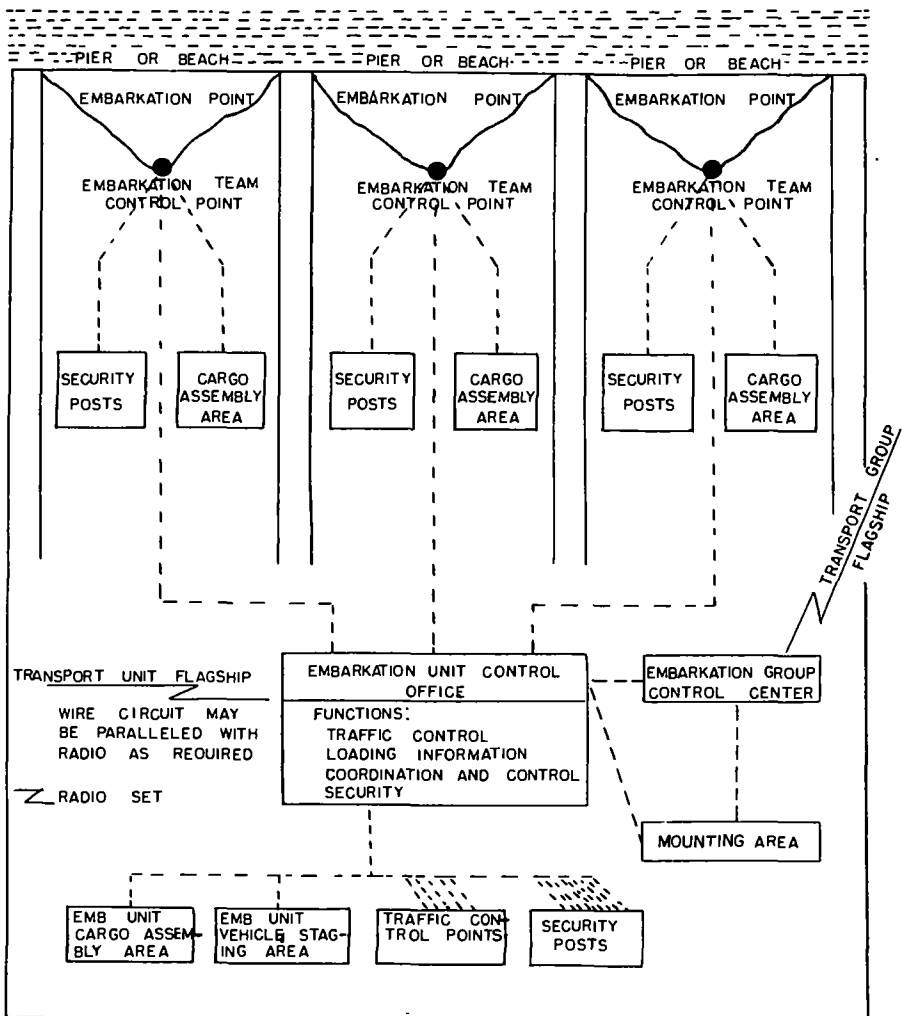


Figure 19. A type embarkation group control organization.

respective ship's berth or on the team's assigned out-loading beach; the group control center and the unit control offices are centrally located within their respective areas of responsibility in the embarkation area.

- (2) Personnel assigned for duty with the embarkation control organization furnish directions and information required for the orderly flow of personnel, supplies, and equipment through the embarkation area. During the

period that landing force organizations are moving personnel and/or cargo into the embarkation area and during the period that loading is in progress, all control offices and points involved are manned continuously. The embarkation group control organization is staffed by personnel assigned to assist the embarkation officers within the landing force organization for embarkation.

70. Methods of Assembling Cargo

a. Two basic methods are used in assembling cargo in an embarkation area:

- (1) Type assembly is the method by which supplies such as rations, ammunition, and fuel are assembled in central dumps in the embarkation area. When an embarkation organization begins loading, it draws supplies in the amount allocated from the appropriate dump.
- (2) In unit assembly each embarkation team is assigned a cargo assembly area within the embarkation area where all cargo is assembled in accordance with the loading plan. Carriers delivering supplies from the base camp or supply depots deliver their cargo to the designated cargo assembly area.

b. Of the two cargo assembly methods, the unit assembly method is the simplest. The short distance from the cargo assembly area to the ship and the fact that cargo is moving from one point only result in effective movement control.

71. Procurement and Concentration

The procurement and concentration of supplies and equipment is coordinated with the embarkation schedules to give the supply agencies time to deliver supplies within the embarkation area and to give embarkation officers time to prepare their loading plans and load the supplies and equipment. Supplies are assembled by the following methods:

a. *Delivery to Units in Marshaling and/or Embarkation Areas.* In this method of assembly, the parent unit prepares shipping documents, initiates requisition action through appropriate technical service channels, and directs delivery at a specified location within stated date requirements. The advance party of the embarkation organization accepts and assembles the supplies and prepares them for loading. This method of assembly is normally used for class II and IV equipment and maintenance materiel.

b. Shipment to Terminal Commands for Units or Individuals. Occasionally it is necessary to ship supplies or equipment from the home station to a unit or individual staging in the area of responsibility of terminal command. In this case supplies are shipped to the terminal for delivery to a unit or individual. When there is a possibility that the unit or individual participating in the amphibious operation may embark and leave the terminal area before delivery can be effected, the shipping document may indicate the oversea destination for further action by the terminal command.

c. Shipment to Terminal Command for Specific Ships. When the amphibious task force commander issues his orders directing certain amphibious ships to begin loading at specified points on specified dates, landing force organizations may ship supplies to the terminal command exercising area responsibility for delivery to specific ship(s). Rations and common items of maintenance materiel are generally handled this way.

d. Shipment to Terminal Command in Bulk. Certain items of supply such as ammunition, intelligence supplies, maps, etc., lend themselves to shipment in bulk. Supplies that are normally distributed evenly among the participation units in an amphibious operation are shipped in bulk to the staging area within the terminal command area of responsibility. This type of shipment conserves transport capability and eliminates handling at the home camp or station of the assigned organizations. To ease the loading, bulk shipments may be divided into identical lots, each containing a proportionate part of all items in the shipment.

e. Shipment to Terminal Command for an Embarkation Group. Supplies such as class III and V are shipped to a terminal command for delivery to embarkation group(s) staging within the command area. These supplies are moved from dumps in the staging area to the embarkation area to be prepared for loading. Documentation from the staging area to the embarkation area is accomplished by the use of pile tags (par. 78c). This type of shipment allows the embarkation group commander to ascertain that supplies assigned to his portion of the landing force are on hand and properly processed before loading begins.

f. Shipment to Ship Assembly Areas. When the amphibious shipping assembly areas are known but specific ship assignments have not been affirmed, supplies may be prepared and shipped into the staging area in the vicinity of the ship assembly. Before specific ships are assigned to the embarkation organization. When this method is employed, the supplies assigned to each embarkation team are segregated into separate lots.

72. Methods of Loading Ships

To insure successful accomplishment of an amphibious operation, equipment and supplies must be loaded so as to provide maximum support to the landing plan and the scheme of maneuver ashore. The manner in which a ship is loaded determines the order and speed with which equipment and supplies can be unloaded and made available for tactical employment. The composition of amphibious task forces will seldom, if ever, be alike. The methods of loading the ships assigned to transport an amphibious force will normally be determined after careful consideration of the factors contained in paragraph 17. There are four military methods of loading: administrative, combat, commodity, and selective.

a. Administrative Loading. Administrative loading makes maximum use of troop billeting and cargo spaces. There is no regard for tactical considerations, unit integrity, or priority for unloading. It is used when direct opposition from the enemy will not be encountered upon landing. This method of landing may be employed when personnel and cargo are transported to the objective area in followup shipping or when tactical employment immediately upon landing is not required. Technical details pertaining to administrative loading are contained in TM 55-513.

b. Combat Loading.

- (1) Combat loading is used for any operation in which opposition from the enemy is anticipated. Combat loading is designed to insure unit integrity and maximum unloading efficiency of the individual embarkation teams and the landing force as a whole. All other considerations, such as economy of space, must be subordinate. Selected units, with their essential combat equipment and supplies, are loaded in such a manner that they will be available to support the tactical plan upon debarkation. Ships must be loaded to provide for flexibility to meet possible changes in the tactical plan and to facilitate discharge of cargo to meet emergency calls for equipment or supplies. Two objectives of combat loading are—
 - (a) That supplies and equipment loaded aboard ship are so stowed as to be available for unloading and delivery to the assault forces at the time and in the order required to support the tactical situation ashore.
 - (b) That the troops, equipment, and supplies are dispersed throughout the amphibious force shipping in such a manner that the loss or diversion of an embarkation

team will not materially affect the tactical integrity of the force embarked in the remaining ships.

- (2) There are three types of combat loading which may be employed, depending upon the mission, organization, types of equipment assigned to the force (including ships), and the planned tactical employment of the force. These are—

- (a) *Combat unit loading.* Combat unit loading is the loading of an assault troop organization, together with its essential combat equipment and supplies, in a single ship in such a manner that it will be available to support the tactical plan upon debarkation. Combat unit loading provides maximum flexibility to meet possible changes in the tactical plan.
- (b) *Combat organizational loading.* Combat organizational loading is the loading of a troop organization with its equipment and supplies on the same ship, but without regard to tactical considerations upon debarkation. It permits debarkation of complete units and equipment which will be available for tactical employment after assembly ashore. This method is more economical in ship space than combat unit loading.
- (c) *Combat spread loading.* Combat spread loading is the loading of troop organizations with their equipment and supplies on two or more ships. This method is commonly used in loading organizations equipped with numerous vehicles and/or large amounts of heavy equipment. Organizations so loaded are available for employment in the landing area upon reassembly of personnel and equipment after landing.

c. Commodity Loading. Commodity loading is a method of loading in which various types of cargo such as ammunition, rations, or boxed vehicles are stowed separately in order that each commodity can be discharged without disturbing other cargo. It is also called block stowage. Portions of compartments are completely filled with items of the particular commodity and are separated from other commodities. Ships are often completely commodity loaded when the cargo consists of class V supplies.

d. Selective Loading. Selective loading is a method of loading and stowing equipment and supplies aboard ship in a manner designed to facilitate issue to designated units. Supplies and equipment are stowed so that they can be discharged and delivered on call. Selective loading differs from commodity loading in that

all classes of supplies required to support specified units are loaded and stowed so as to be discharged according to planned and/or anticipated requirements.

73. Combat Loading Planning Factors

The following factors must be considered during combat loading:

a. Rations, ammunition (both small arms and high explosive), water, and fuel are stowed so as to be accessible for discharge at any time.

b. High explosives and petroleum products are stowed in designated spaces only. Very sensitive explosives such as fuzes and pyrotechnics are stowed in special ammunition lockers designed for such cargo.

c. Petroleum products and high explosives are not stowed in the same hold. There must be transverse steel bulkhead between these two types of cargo.

d. Vehicles to be landed with a given serialized element are loaded to permit expeditious unloading to meet the landing time schedule. Wherever possible, vehicles are stowed fore and aft to minimize movement of vehicles when the ship rolls. Batteries are disconnected. The driver is embarked in the same ship with his assigned vehicle. The assignment of an assistant driver is desirable.

e. In stowing a prime mover and towed piece of equipment, care should be taken to insure that the two pieces are stowed in the same compartments, for they must be moved ashore in the same craft. The towed piece is removed from the cargo space and loaded in the after end of the assault craft cargo space. The prime mover is then loaded in the craft forward of the towed piece and hookup is effected.

f. In lashing vehicles in the cargo spaces, maximum use should be made of quick-release gear (pelican hooks) to simplify and speed the discharge of vehicles with small numbers of personnel.

g. Whenever possible, supplies should be stowed in organization vehicles. When mobile loading is employed, care must be taken to insure that the gross weight of the vehicle does not exceed the safe working load of the cargo gear operating on the hatch in which the vehicle is stowed. General cargo not mobile loaded should be stowed in the cargo compartment in cargo nets or as palletized units for ease and speed in unloading.

h. If the ship does not have materials-handling equipment for

movement of cargo within the cargo compartment, unitized cargo is stowed vertically in or immediately adjacent to the square of the hatch.

i. The time required for such operations as opening hatches and shifting cargo rigging must be considered when estimating unloading time (par. 46b).

j. The relationship between yard-and-stay and heavy-lift cargo gear should be understood by embarkation officers. Normally the yard-and-stay and the heavy-lift cargo gear obtain their power from the same cargo winches. To increase the lifting capacities of these winches, they are geared down by the use of multiple sheave blocks. Both yard-and-stay and heavy-lift cargo gear are normally installed on the same hatch, but as only one set of winches is normally available it may be necessary to secure one set of cargo gear to operate the other. Heavy-lift cargo gear operation is too slow for working general cargo, and yard-and-stay cargo gear normally cannot lift loads in excess of 5 tons. Stowage of light lifts in a hatch requiring the use of heavy-lift cargo gear should be avoided; likewise, the stowage of a few heavy lifts with general cargo should be avoided if possible. When space available dictates that general cargo and heavy lifts must be stowed in the same hold, cargo to be discharged after the cargo rigging has been changed should be low-priority cargo.

k. When palletized unit loads are placed in the square of the hatch, the last few key pallets in each tier must be landed and stowed with the slings attached. These slings are left on the pallets to ease and speed discharge of the pallets by providing working space for personnel and/or materials-handling equipment upon removal of the key pallets.

l. In estimating shipping requirements, allowances must be made for broken stowage (par. 77).

74. Naval Considerations in Loading

a. Distribution of loads among ships is an important consideration during planning and embarkation. Naval transport organization commanders plan to have all ships assigned to their organization complete unloading at about the same time so that the ships of a transport organization may leave the objective area together.

b. Amphibious ships should not be loaded beyond their combat-load capacity. Frequently ships may embark personnel in excess of their rated capacity. This must be accepted in lieu of assigning additional shipping when necessity dictates. However, the quan-

tity of cargo loaded in ships must not be such as to make rapid unloading impossible. No arbitrary limit may be set for ship capacity since this depends upon the type and class of vessel, number and size of vehicles to be embarked, and amount and types of supplies and equipment carried.

c. Ship stability and safety are naval responsibilities.

d. Ship's commanding officers will desire that the unloading of all cargo spaces in their individual ships be completed as nearly as possible at the same time. This will insure the most efficient use of the ship's cargo gear and permit the ship to leave the areas exposed to enemy attack at the earliest practicable time. When the sea echelon concept (par. 3) is employed, the ship's commanding officers and transport organization commanders will be required to complete discharge and have their individual ships and transport organizations ready for redeployment at specific times.

75. Methods of Stowage

After the methods to be employed for loading the assigned ships have been resolved, the methods of stowing the cargo on these ships are determined. The methods of stowage employed on each ship are normally based upon the same factors considered in determining the method of loading (par. 17). In amphibious operations, the stowage of general cargo required to support a landing force may include all of the methods discussed below:

a. *Horizontal Stowage.* Horizontal stowage is the lateral distribution of unit equipment or categories of supplies so that they can be unloaded simultaneously from two or more holds.

b. *Vertical Stowage.* Vertical stowage of unit equipment or a given category of supplies is a method of stowage in depth within a single compartment by which the loaded items are continually accessible for unloading, and the unloading can be completed without corresponding changes or prior unloading of other cargo.

c. *Balanced Stowage.* Balanced stowage is loading a ship with precalculated increments of items of all classes and services in quantities proportional to expected or estimated unit rates of consumption or needs for a specific number of personnel.

d. *Block Stowage.* See paragraph 72c.

76. Understowing

Bulk cargo stowed under vehicles within the same compartment is said to be understowed. This technique provides for greater utilization of a compartment's cube.

a. Factors to be considered when employing this technique are as follows:

- (1) Cargo consisting of containers of uniform size and strength are particularly desirable.
- (2) Understowed cargo should be covered with two or three layers of dunnage.
- (3) Cargo must be capable of sustaining vehicle weight without being crushed. Heavy vehicles should not be overstowed.
- (4) For the purposes of stability and to minimize shoring requirements, understowed cargo should cover the entire deck area of the cargo compartment.
- (5) Vertical clearance between the top of the understowed cargo and the hatch coaming is the critical dimension with respect to the height of the understow.

b. In combat loading, only very low priority cargo in the lower hold sections should be understowed.

c. Understowing may be employed when loading the tank deck of an LST. Beaching weight limitations will normally preclude understowing more than a portion of the tank deck. When this method is used, the understowed cargo is located in the after end of the deck and across its entire width. The same considerations of overhead clearance and vehicle stowage apply here as in the case of a cargo ship. In addition, provision must be made for improvising a ramp to permit vehicles to drive off the understowed cargo when the ship beaches. Great care must be exercised to insure that the beaching load limit of the landing ship is not exceeded.

77. Broken Stowage

In stowing cargo, a certain amount of space is invariably lost between boxes, between vehicles, around stanchions, etc. When vertical stowage is used, overhead space must be left clear to allow room to work the cargo. Collectively, these losses are expressed in terms of a percentage known as a broken stowage factor. This factor will vary, depending upon the type and size of vehicles, type and size of general cargo, state of training of loading personnel, type of loading, method of stowage, and configuration of the cargo compartments. These factors are based on the assumptions that cargo is properly packed and crated and that stowage is accomplished by trained personnel. To insure that broken stowage factors are not exceeded, personnel assigned to load amphibious ships must be thoroughly familiar with the loading plan and must

be closely supervised during loading. Failure to comply with the loading plan and/or lack of proper supervision may result in the loss of shipping space on amphibious ships, which are always in short supply. Broken stowage factors which may be used for planning purposes are as follows:

a. Vehicle Stowage. In the stowage of vehicles, plans are primarily concerned with deck area (square feet) since vehicles occupy a fixed amount of deck space.

- (1) To determine the amount (square feet) of vehicles that can be stowed in a given area (square feet) of deck space, the following method is used:

- (a) For APA-type ships, deduct 25 percent from the square feet of deck space listed in the ship's loading characteristics pamphlet as suitable for the stowage of vehicles. For example: a ship's loading characteristics pamphlet indicates 8,000 square feet of deck space suitable for vehicle stowage available. When the broken stowage factor (25 percent) is deducted, the remainder is the amount (square feet) of vehicles that can be stowed (6,000 square feet).

- (b) For AKA, LST, LPH, LPD, and LSD classes (using well deck and/or superdeck for vehicle stowage on LPD and LSD), deduct 20 percent from the square feet of deck space listed in the ship's loading characteristics pamphlet as suitable for the stowage of vehicles.

- (2) To determine the area of deck space (square feet) required to stow a given amount (square feet) of vehicles, the following method is used:

- (a) For APA-type ships, add 33⅓ percent to the square feet of the vehicles to be stowed. For example, the square feet of vehicles to be stowed is 6,000 square feet. By applying the broken stowage factor of 33⅓ percent and adding it to the vehicle total, the result will indicate that a total of 8,000 square feet of deck area is required to stow 6,000 square feet of vehicles.

- (b) For AKA, LST, LPH, LPD, and LSD classes (using well deck and/or superdeck for vehicle stowage on LPD and LSD), add 25 percent to the square feet of vehicles to be stowed to determine the amount of deck area required.

b. Bulk Cargo Stowage. In the stowage of bulk cargo, plans are primarily concerned with volume (cubic feet) since the physical

shape of a given amount of cargo may be changed but the space the cargo will occupy remains constant.

- (1) To determine the volume of cargo that can be stowed in a given space, deduct 20 percent from the cubic feet of space available for the stowage of bulk cargo. For example, the space available for the stowage of bulk cargo is 40,000 cubic feet. The broken stowage factor of 20 percent equals 8,000 cubic feet. Deducting this 8,000 cubic feet of lost space from the space available indicates that 32,000 cubic feet of cargo can be stowed in the 40,000 cubic feet of available space.
- (2) To determine the amount of space required to stow a given volume of cargo, add 25 percent to the volume (cubic feet) of the cargo to be stowed. For example, the volume of the cargo to be stowed is 32,000 cubic feet. The broken stowage factor of 25 percent applied to the volume of cargo to be stowed equals 8,000 cubic feet. Adding this lost space to the cargo to be stowed indicates that 40,000 cubic feet of cargo space is required to stow 32,000 cubic feet of cargo.

c. Exceptions. The stowage of certain types of cargo results in greater broken stowage losses than those outlined above. Drummed POL and unitized cargo are examples. There are increased losses in stowing drummed POL because of the lost spaces around the drums caused by the drum configuration and other losses that occur when a stowage height limitation must be employed for safety or other reasons. Unitized cargo is normally uniform in size, but requires a level deck for safe stowage. This results in space losses caused by hull curvature, deck irregularities, stanchions, etc. An additional factor that must be considered with all unitized cargo in combat loading is vertical clearance. Normally palletized units are not stacked more than two high. If pallets stacked two high do not fill up the vertical space to the overhead, the space between the top of the highest pallet and the overhead must be considered lost space. For broad planning purposes, when these types of cargo are to be stowed deduct 25 percent from the space assigned to find the volume of cargo that can be stowed or add $33\frac{1}{3}$ percent to cargo to be stowed to find the space required to stow the cargo.

78. Movement of Cargo to Embarkation Area

a. Class I, III, IV, and V supplies and equipment are delivered to the embarkation point from 24 hours to several days before loading. Delivery time depends on whether the embarkation point

is in use by other organizations. Class II supplies and equipment are usually moved to the embarkation point within 24 hours of troop embarkation. The mode of transportation to the embarkation area is contingent upon the means available and the distance involved. In general, rail movement is the most economical method for distances in excess of 50 miles for units with normal amounts of organic transportation, and truck movement is more economical for distances of less than 50 miles.

b. Movement of cargo to the assembly points within the embarkation area must be completed in time to permit detailed inventory before loading starts.

c. When trucks move cargo to the embarkation point, each truck carries cargo destined for one hold and one deck level. Drivers are furnished Cargo Pile Record (DA Form 2539-R), which will be locally reproduced on 8" x 10½" paper, which indicate the destination by embarkation area, embarkation office, and embarkation point; the shipping agency; and the date-time groups of dispatch and receipt. The Cargo Pile Record (fig. 20) is prepared in three copies. The shipper retains one copy, and the driver is given two copies. Upon arrival at the embarkation area, the driver delivers one copy of the Cargo Pile Record to the unit embarkation office and one copy to the embarkation point. The use of the Cargo Pile Record allows the shipper and embarkation organization to keep an accurate record of the amount of supplies delivered and the amount due.

79. Movement of Cargo from Assembly Point to Ship

a. At the cargo assembly point the cargo is laid out by deck level and hold in accordance with the stowage plan. All holds are loaded simultaneously beginning with cargo to be stowed in the lowest deck level and proceeding upward until all deck levels have been loaded according to plan.

b. The method used to move cargo from the assembly point to the ship will depend primarily upon the type of surface over which the cargo is to be moved. Vehicles will normally be delivered to the ship under their own power. Other cargo may be moved by materials-handling equipment or trucks. The type of equipment used will be determined by the commander of the organization assigned to support the embarkation.

c. The rate of flow of the cargo from the assembly area to the ship must be controlled to prevent congestion at the ship's berth. Control can best be established by communications between the ship and the cargo assembly area. When a buildup of cargo for

CARGO PILE PROOF (FM 60-30)		PAGE NO.	NO. OF PAGES
EMBARKATION AREA <i>IV</i>	EMBARKATION OFFICE <i>ECNO</i>	EMBARKATION POINT <i>2</i>	
SHIPPING AGENCY <i>Ammunition Supply Point</i>			
DATE TIME GROUP DISPATCH <i>041020</i>		DATE TIME GROUP RECEIPT <i>041135</i>	
AMOUNT	TYPE OF CARGO	WEIGHT	
<i>20 bx.</i>	<i>AMMUNITION: Rifle, Cal. 30, Ball</i>	<i>2020</i>	
<i>20 Crate</i>	<i>Mortar, 60-mm, Illum</i>	<i>2800</i>	
<i>10 bx.</i>	<i>Rifle, 75-mm, (Recoilless, HE</i>	<i>730</i>	
<i>5 bx.</i>	<i>Rifle, 75-mm, (Recoilless, Smoke, WP</i>	<i>370</i>	
		<i>5920</i>	

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Figure 20. Cargo pile record.

one hold occurs at shipside, embarkation organization control personnel on the ship should reduce movement to that hold to the rate at which the cargo is being loaded. If cargo gear working a hold should break down, movement of cargo to the hold should be suspended until loading operations can be resumed. When support

agencies other than those contained within the embarkation organization have been assigned loading responsibilities, the embarkation team commander may be required to assist in movements control by lending to or operating for the responsible agency such control and/or communications facilities as may be required to coordinate the flow of cargo to the ship.

d. Cargo at the assembly area must be moved to the ship by priority number. Those items of cargo having the highest number (lowest priority) must be moved first and in sequence so that the last item moved will have the lowest number (highest priority). The ship must be kept informed as to the number and type of drafts remaining in the assembly area for each hold and deck level.

e. When embarking over the beach, the embarkation team should be furnished rough-terrain materials-handling equipment for the movement of cargo. When palletized unit loads and/or containers are to be loaded, rough-terrain forklifts will be required at the embarkation point and on the beach in the objective area. The handling of palletized unit and containerized loads aboard ship normally requires the use of low-masted, pneumatic-tired forklifts in the cargo spaces. If these forklifts are not available aboard ship, the loading plan will require stowage of these palletized unit and containerized lifts on or adjacent to the square of the hatch, or the embarkation team commander may arrange to have the required equipment placed aboard his assigned ship for the duration of the amphibious operation.

f. The embarkation team commander may be required to furnish personnel to move cargo out of the cargo assembly area once loading has begun, although this is normally a function of supporting (external) agencies. Personnel requirements will vary with the type of ship and amount of cargo to be loaded, but up to 100 men with proper supervision may be required. The ship's platoon will not be available to support shore operations when loading begins.

g. Loose cargo is placed on pallets before movement to the embarkation point. This allows for rapid discharge of the carrier by mechanical materials-handling equipment, reduces the amount of storage space required for supplies in the cargo assembly area, and facilitates movement of the cargo from the assembly area to the ship's hold.

80. Movement and Stowage of Cargo in Ship's Hold

The techniques of loading and stowing cargo in the holds of ships are discussed in detail in TM 55-513. Factors to consider when stowing a combat load are as follows:

a. Stow cargo in the wings and the areas forward and aft of the square of hatch before loading the square of the hatch. Cargo placed on the square of the hatch is the highest priority cargo stowed on that particular deck level.

b. If vehicles are moved into place in the hold under their own power, running time on their engines should be kept to an absolute minimum.

c. Cargo is stowed in a manner to facilitate rapid discharge in the objective area. In preparing stowage plans and stowing cargo, the equipment available for discharge upon arrival of the ship in the objective area must be considered. For example, on a ship having two forklifts, palletized unit loads would be tiered in the wings only in the two hatches in which the forklifts are to be used. In the remaining hatches stowage of palletized unit loads would normally be limited to the square of the hatch.

d. In any space in which internal-combustion engines are operated, maximum ventilation is provided and a flame safety lamp is employed to determine when the carbon monoxide level becomes dangerous. Internal-combustion engines are never operated in cargo spaces in which class III or V supplies are stowed in bulk.

81. Cargo Security

a. The security of cargo loaded in an amphibious ship is the responsibility of the ship's captain. Cargo is secured aboard ship in accordance with the desires of the captain and/or his subordinates.

b. The embarkation staff is responsible for packaging and crating cargo to prevent damage from handling, chafing, crushing, or moisture.

c. In amphibious operations, there will be some equipment such as missiles, special-purpose equipment, vehicles, etc., that will require special handling and stowage. Although the ship's captain is responsible for the delivery of these items, all technical advice and assistance available must be furnished by the embarkation organization involved to insure safe handling and delivery.

82. Troop Embarkation

a. When tactical billeting is to be employed aboard ship, troops arriving at the embarkation point are organized into the formation for embarkation. The embarkation team embarks in boat team or helicopter team formation. Teams billeted in the lower

troop compartments aboard ship are embarked first, whenever possible.

b. When the ship is berthed at a pier, troops are marched or trucked from the staging area to the pier. They board the ship over a gangplank. When the ship is in the stream, the troops are ferried out to the ship in landing craft or amphibious vehicles. Upon arrival alongside the ship, the troops embark up an embarkation net or up an accommodation ladder leading from the waterline of the ship to the main deck. The embarkation net is a large rope net hung over the side of the ship from the main deck to the waterline. Troops boarding by net use the horizontal lines for stepping rungs and the vertical lines for hand holds. The use of nets for embarkation should be minimized where possible to preclude loss of individual equipment and/or injury to personnel. When an LST is embarking personnel alongside a pier, accommodation ladders are used, but if embarkation is conducted on the beach or in the stream, troops board over the bow ramp of the LST onto the tank deck.

c. Each person embarked is checked against the embarkation roster. Once embarked, personnel are not permitted to leave the ship. Organized details may leave the ship, but they are checked off and on each time they do so. Checking troops aboard may delay the embarkation and result in errors in the embarkation roster unless the checkers are well organized. When troops are embarked on a transport berthed alongside a pier, a checking officer representing the embarkation team commander is stationed at the foot of each gangplank. The checking officer is accompanied by a commissioned or noncommissioned officer from the unit being embarked. The unit officer confirms the identification of each passenger, thus speeding the check. When troops are in transports anchored in the stream, the same procedure is employed except that the checking officer and unit representative are located on the deck of the transport at the point that troops are boarding. Several methods of checking and identifying passengers have been employed successfully. One method is to have each man give his serial number when his name is called. Another is to call each man's name and have him give his first name and middle initial. A third method is a card system in which each embarking man hands the checker a card on which is recorded his name, rank, serial number, and organization. These cards are then checked against the embarkation roster.

d. Members of the advance party are checked on the embarkation roster. This is accomplished by the team embarkation officer who furnishes the checking officer with a complete and

certified list of all members of the advance party before troop embarkation begins.

e. The first troops aboard are billeted in the lower troop compartments. Compartments are filled from bottom to top. When troop arrivals at the embarkation point are not according to schedule and excessive congestion will result if the embarkation schedule is maintained, troops may have to embark as they arrive regardless of the schedule. As troops embark, they are met by guides who lead them to their assigned compartment. Troops remain in their assigned compartment until embarkation is completed and a muster is taken.

f. As each organization assigned to an embarkation team completes embarking, the organization conducts a physical muster (sight check), verifies and/or corrects the organization embarkation roster, and submits the corrected roster to the team embarkation officer. The team embarkation officer prepares a consolidated embarkation roster from the embarkation rosters submitted by each embarked organization. To allow for last-minute personnel changes and to reduce the administrative workload, the consolidated embarkation roster is prepared in final form not more than 48 hours before sailing. To meet distribution requirements, the consolidated embarkation team roster is normally prepared on stencils for reproduction.

g. Each man is assigned to a bunk. He places his equipment on the bunk and remains in the immediate vicinity. Troops are cautioned against placing their gear on one bunk and occupying another, unless certain bunks are designated for stowage, and against stowing their gear on pipes or ventilators, in passageways, or in other unauthorized places. Normally a diagram of the recommended manner of stowing individual gear will be posted in each troop compartment.

SECTION IX

LOADING AND EMBARKING AIRMOBILE FORCES

83. General

a. Current amphibious doctrine provides for delivery of landing force organizations to landing areas within the objective area by surface and aerial means. To support the delivery of landing force organizations by aerial means, the U.S. Navy has developed new shipping and modified existing ships.

b. United States Navy ships designed to support airmobile landing teams are Amphibious Assault Ship (LPH) and Amphibious Transport, Dock (LPD). Modified naval shipping employed to support the aerial landing are *Essex* class support Aircraft Carriers (LPH), *Mariner* class Attack Cargo Ship (AKA), and *Mariner* class Attack Transport (APA). Other types of amphibious ships that may be employed to support airmobile landing teams are Landing Ship, Dock (LSD) and the newer classes of Landing Ship, Tank (LST).

c. Embarkation and loading procedures discussed in this chapter are limited to those procedures employed to embark troops and load cargo on Amphibious Assault Ships (LPH). Embarkation and loading procedures applicable to AKA and APA modified to support airmobile landing teams are obtained by combining the content of this section with section VIII. Embarkation and loading procedures applicable to loading LPD and LST-type ships employed to support airmobile forces are obtained by combining the content of this section with sections VIII and X.

84. Planning Considerations

Planning embarkation of landing force organizations in Amphibious Assault Ships (LPH) involves the following considerations:

a. Liaison must be established between troop and aircraft units at the earliest practicable time in order that the overall requirements of the embarkation organization may be ascertained.

b. The team embarkation officer prepares the loading plan for both the air and ground units to be embarked.

c. The aircraft unit, troop unit, and supplies and equipment to be landed by aircraft during the assault are embarked together in the Amphibious Assault Ship from which they are to execute the ship-to-shore movement.

d. Loading plans are based on the number of aircraft loads and on unloading priorities established by the airmobile force commander.

e. Unloading plans include details required to insure rapid and efficient transfer of cargo from stowage spaces to hookup points aboard ship.

f. High-priority and emergency supplies must be located so as to be readily accessible on D-day.

g. Airmobile force units must be embarked throughout the Amphibious Assault Ships in a manner to allow for the simultaneous landing of the assault troops at the selected time and place and in a prescribed tactical formation. Tactical integrity of elements in surface landing teams is maintained by embarking company-size or larger troop units in a single ship. Assault elements load into assault craft at approximately the same time for movement to the landing beach. This method of embarkation and debarkation is often impractical in the aerial ship-to-shore movement. The number of troops which can be lifted simultaneously from a single flight deck is small and aircraft (helicopters) are unable, owing to limited endurance, to stand by until a tactical organization has been lifted from a single ship and is ready to be dispatched to the landing zone. Large tactical organizations, if they are to be landed as a unit, may have to be embarked in several ships. Therefore, when troops are embarked in Amphibious Assault Ships, unit integrity may be sacrificed en route to the objective area and regained when the unit is landed.

85. Loading Plan

The same forms, diagrams, tables, and procedures used to prepare the loading plan for landing force organizations landed by surface means (sec. VI) are used to prepare the loading plan for the portion of the landing force landed by aerial means.

86. Advance Party

The advance party requirements for the LPH will be approximately the same as for other types of amphibious ships.

a. The ship's platoon, which will normally consist of 1 officer and 30 enlisted men, must be trained in aircraft loading and preparation of palletized unit loads.

b. It may be necessary to include aircraft maintenance personnel in the advance party to establish and coordinate maintenance procedures and determine service stock and spare parts requirements.

87. Embarkation and Loading

a. The airmobile landing team, less aircraft and aircraft operating personnel, board the LPH through an embarkation area in the same manner that surface-landed forces board ship. Aircraft and aircraft operating personnel are embarked by flying the aircraft onto the flight deck of the LPH.

b. Vehicles are driven aboard the LPH over a ramp leading from the hanger deck of the LPH to the dock. Vehicles are driven aboard under their own power. Each vehicle, loaded as it is to be landed by aircraft, is weighed before it is loaded aboard the LPH. In addition to the information marked on each vehicle (par. 54a (7)), the driver's name is printed on the windshield or windshield crate. The driver is weighed with the vehicle and his name printed on the vehicle to assure that the proper gross weight of the vehicle, with driver, is recorded and to insure that the assigned driver is available at the time the vehicle is ready for pickup.

- (1) Once vehicles are aboard ship, nothing may be placed in the vehicle that adds to its weight without permission of the ship combat cargo officer.
- (2) Vehicles are normally stored on the hangar deck and delivered to the flight deck by elevator.
- (3) In the initial waves, two hookup points for vehicles and/or supplies are employed. These hookup points are located on the after end of the flight deck.

c. All supplies loaded aboard ship for delivery to the landing zone by aircraft are palletized. Pallet weight is normally limited to between 1600 and 1800 pounds. Palletized cargo is landed on the hangar deck by ship and/or dock cranes and moved into its assigned stowage space by the use of materials-handling equipment and elevators. Palletized cargo is delivered to the flight deck by the aircraft elevator and moved into pickup position by MHE operated on the flight deck by the ship's crew and/or ship's platoon.

88. Amphibious Assault Ship (LPH) Characteristics

The U.S. Navy has two classes of LPH. Both classes are capable of lifting and supporting a battalion-size airmobile land-

ing team. One class of LPH (*Iwo Jima*) is designed and built for the operation of helicopters. The other class (*Boxer*) is support aircraft carriers (CVS) modified to support the landing of assault troops by helicopter.

a. The *Iwo Jima* class LPH has good troop accommodations; sufficient cargo and vehicle stowage areas; and provision for carrying jet fuel, aviation gasoline, and mogas in bulk.

- (1) The flight deck is laid out with helicopter loading points located forward and aft. Troop staging areas are located in convenient and protected area adjacent to loading points.
- (2) Under the flight deck there is a complete gallery deck where offices, staterooms, and troop accommodations are located.
- (3) There are four large cargo compartments centrally located and well protected.
- (4) Cargo capacity is 900 tons, including vehicles.
- (5) Two cargo elevators (capacity 35,000 pounds) and special cargo-handling equipment and facilities are arranged to allow for movement of cargo to the flight deck at a rate approximately 150 short tons per hour.
- (6) The ship is fitted with tanks to store approximately 262,000 gallons of JP fuel, 20,000 gallons of aviation gasoline, and 6,500 gallons of motor gasoline.
- (7) All living, office, messing, and electronic equipment spaces are air-conditioned.

b. The *Boxer* class LPH has approximately the same troop and cargo capacity as the *Iwo Jima* class. However, in preparing loading and unloading plans for the *Boxer* class LPH, the following factors must be considered:

- (1) Cargo compartments are not suitable for stowage of unitized cargo. Some unitized cargo (6,000 to 8,000 cubic feet) may be stowed on the hangar deck for movement to the flight deck and delivery to the landing zone early in the assault. As the unitized cargo on the hangar deck is depleted, loose cargo stowed in below deck spaces is delivered to the hangar deck where it is palletized. This palletized cargo is then delivered to the flight deck for hookup.
- (2) These ships do not have bulk storage facilities for the fuel required by turbine-engine-powered helicopters.

When helicopters requiring JP fuel are aboard, it will be necessary to load fuel tank aboard ship to provide this facility.

c. The LPH has facilities to store large quantities of fuel in bulk. Because of safety requirements, packaged fuels are not placed in cargo compartments. To satisfy the requirement of air-mobile landing teams for packaged fuels, empty GI cans (5-gallon) are strapped on pallets (18 to a pallet) and stowed empty. On D—1 these cans are filled, using refueling facilities aboard ship. In order to ease handling problems in cargo stowage spaces aboard ship, 5-gallon water cans are also handled in this manner. Fuel and water cans *are not* removed from the pallet while filling.

89. Amphibious Transport, Dock (LPD) Characteristics

a. The LPD combines characteristics of the AKA, APA, LSD, and LPH. The ship has large cargo stowage areas equipped with special cargo-handling gear for movement of cargo to the flight deck and to assault craft loading stations. Troop compartments and messing facilities will accommodate 900 troops. The hull design (*Thomaston* class LSD) provides for flooding down to accommodate a limited number of assault craft (one LCU or three LCM). A flight deck large enough to accommodate and operate six medium transport helicopters covers the cargo well.

b. Cargo-handling experience with the special cargo-handling gear installed in this ship is inadequate to furnish definite loading data (see par. 46c).

90. Shipboard Aircraft Operations

For the purpose of this manual, landing force aircraft employed in the assault phase of an amphibious operation as ship-to-shore aerial means is limited to helicopters. The stowage and handling of aircraft aboard Navy ships varies according to the characteristics of each particular ship and the procedures established aboard each ship.

a. Stowage.

- (1) Helicopters are stowed in the hangar deck and secured to the flight deck during embarkation and while en route to the objective area. Rotor blades are folded, and helicopters are secured on the hangar and flight decks in accordance with the Amphibious Assault Ship's standing operating procedures.

- (2) Helicopters remain secured in position until close to the objective area. Time required to prepare helicopters for launching should be accurately determined in advance, since it may affect the landing plan.

b. Hangar Deck.

- (1) The ship's hangar deck officer is responsible for and controls movement and stowage of aircraft on the hangar decks.
- (2) Ship and helicopter unit personnel are used for handling and securing helicopters on the hangar deck.
- (3) Helicopter maintenance is performed primarily by helicopter unit personnel.

c. Flight Deck.

- (1) Flight deck operations are controlled by the Navy flight deck officer who employs ship and helicopter unit personnel.
- (2) The ship furnishes plane-handling supervisors to supervise helicopter handling on the flight deck. The plane handlers can be either ship or helicopter unit personnel.
- (3) The control of helicopters on the flight deck from starting of engines to takeoff rests with flight control (LPH air operations officer) at the primary flight control station.
- (4) Helicopters are launched and retrieved heading into the wind. At anchor, the ship's bow will head into the wind. Underway, the ship will maintain a heading that will head the bow into the relative wind while launching and retrieving.
- (5) Minor helicopter maintenance can be accomplished on the flight deck while flight operations continue. Major maintenance is accomplished on the hangar deck.
- (6) Refueling is accomplished by ship and helicopter unit personnel utilizing flight deck facilities.

91. Cargo Preparation

a. General.

- (1) In the preparation of cargo for transport by helicopter, weight and dimension limitations will vary with the type of helicopter assigned to perform a given mission. In the assault phase, most supplies and equipment transported by helicopters will be externally loaded and airlanded. External loading requires that all supplies and

equipment be packaged to facilitate lifting either by cargo nets or cargo slings.

- (2) Supplies with known consumption factors, such as rations and ammunition, are palletized and banded to form a palletized unit load. The weight and size of these lifts will be standardized, weight and dimension limitations being based upon the assigned aircraft capabilities and tactical requirements.
- (3) Items of cargo which, because of size, shape, or weight, do not lend themselves to palletization, are placed in cargo nets and delivered in a loose condition.
- (4) Heavy lifts, such as vehicles, will be handled as separate lifts and delivered as a sling load. During the assault phase, all lifts requiring slings are delivered to the flight deck with slings attached or with slings on the lift ready for attachment.
- (5) Each lift placed on the flight deck for transport by helicopter must have its weight properly and accurately marked. This weight must reflect the total weight of the lift, including cargo, pallet, and sling and/or cargo net. Any lift that exceeds the set weight or size limitations will be hooked up only when the lift has been authorized by proper authority and only to the aircraft designated to make the lift.

b. Palletized Unit Loads.

- (1) Most supplies delivered to support airmobile landing teams will be palletized. Supplies are palletized to facilitate transport from the carrier to the landing zone by external loading by aircraft and to effect direct supply support to using units.
- (2) Pallets are loaded manually and then strapped. Simple handtools are used. The tools required for strapping and marking include strapping dispenser, strapping, corner protectors, strap tensioning tool, strap sealing tool, strap cutter, stencil, stencil brush or roller, and stencil ink. A combination tool is available that will tension, seal, and cut metal strapping.
- (3) When the complete load has been placed on the pallet, it is ready for strapping. Two steel straps are secured lengthwise, and two or three straps are secured across the load, depending on the size of the cartons or boxes that make up the top layer of the pallet load. Corner protectors may be used if their use is required. As each

strap is placed around the load, it is tensioned and sealed. After each load is made up, it is stenciled with the necessary markings (fig. 15).

- (4) The gross weight of pallets delivered by external lift averages between 1600 and 1800 pounds. The gross weight of pallets is determined by the mission requirements and aircraft capability. In no case will the gross weight of pallets exceed 3,000 pounds. If internal loading is used to deliver palletized supplies, pallet dimensions and gross weights will vary with the type helicopter employed. Internal loading of pallets is not recommended and should be avoided during the assault phase of an amphibious operation.
- (5) The number of personnel required to palletize supplies will depend upon the amount of supplies to be palletized and the time available. For planning purposes, results of tests indicate that palletization rate will average 1 ton per man per hour, using pallet makeup lines (gangs). Pallet makeup lines consist of two pallet loaders, two strappers, one stenciler, and one checker.

92. Methods of Loading Helicopters

a. External Loading. In external loading the helicopter picks up the lift while hovering and delivers it while hovering. At the delivery point the cargo can be set down (air-landed) or dropped without landing the aircraft. This method allows delivery at sites that require little or no preparation. Moreover, cargo can be air-landed with minimum exposure of aircraft and receiving personnel to enemy fire. When operations are conducted from a carrier transport, external loading and delivery result in maximum flight deck productivity and flight deck congestion is minimized. Requirements for materials-handling equipment and for skilled personnel are minimum as materials-handling equipment is used only aboard the carrier. External loading and delivery are accomplished in the following steps:

- (1) Cargo preparation (palletizing).
- (2) Movement and stowage aboard ship (materials-handling equipment required).
- (3) Attachment of external cargo lifting device (materials-handling equipment required).
- (4) Hookup.
- (5) Air delivery.
- (6) Landing.

b. Internal Loading. Internal loading in amphibious operations is normally limited to the transport of personnel, certain types of supplies, and crew-served weapons. When materials-handling equipment is available at the landing site and when labor and time are available to prepare pallets to size and weight requirements of the various types of helicopters employed, internal loading of cargo at lengthy operating radii is more efficient than external loading. When the H-21 is used in an operating radius in excess of 75 miles, internal loading is more efficient. When the H-34 or the H-37 is used in an operating radius in excess of 25 miles, internal loading is more efficient. It must be remembered that, if internal loading is used, its efficiency depends on the cargo-handling capability in the landing zone and on the flight deck. There are ten steps involved in preparing and delivering internally loaded cargo, as follows:

- (1) Cargo preparation (palletizing).
- (2) Movement and stowage of cargo aboard ship. ¹
- (3) Movement to and positioning aboard aircraft. ^{1 2}
- (4) Internal cargo restraint (strapping).
- (5) Weight and balance computation (center of gravity).
- (6) Air delivery.
- (7) Landing.
- (8) Release of cargo tiedowns.
- (9) Positioning for discharge. ²
- (10) Discharge. ¹

c. External and Internal Loading. Combination of external and internal loading are employed to transport certain types of equipment (crew-served weapons, vehicles, etc.) with the personnel assigned to operate it. The equipment is loaded externally and the personnel internally. The equipment is prepared (slung) for lift, personnel enplane, and the aircraft takes off and hovers over the equipment for hookup. When the hookup is completed, the helicopter takes off and proceeds to the assigned landing site. Upon arrival at the landing site, the helicopter air-lands the external load; then the helicopter is landed to discharge personnel. Rehearsal should include enplaning and deplaning drills, with emphasis on the placement of personnel within the aircraft.

93. External Load Suspension

Transport helicopters are equipped with cargo release hooks suspended beneath the aircraft fuselage. They are suspended on wire slings and so arranged that the cargo hook is located

¹ Requires materials-handling equipment (forklift).

² Requires special equipment for movement within aircraft.

under the center of gravity of the aircraft. The attachment of cargo to the cargo release hook is accomplished by slings or nets, or a combination of both (FM 1-100). The attachment of the cargo-lifting device to the cargo hook is manual, but the release of the lifting device can be either automatic or manual. The methods employed for suspending cargo beneath the fuselage are essentially the same for all helicopters.

94. Hookup

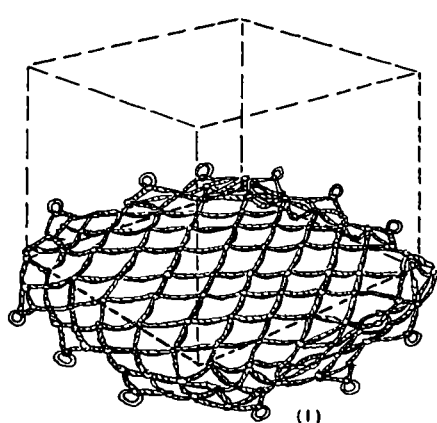
a. The term hookup as used in this manual refers to the securing of an external lift to the cargo release hook suspended beneath a helicopter. Before the helicopter is waved into position for hookup, it is the responsibility of the ground crew to inspect the lift to see that it is properly slung and that the shackle or ring is atop the lift ready to be attached to the cargo release hook.

b. The ground crew employed for hookup is normally composed of three men. One acts as signalman, one as hookup man, and the third relays signals from the hookup. As the helicopter approaches the hovering point, the signalman assumes a position approximately 100 feet forward of the aircraft on the pilot's side at about a 45° angle relative to the heading of the aircraft. As the helicopter reduces altitude, the signalman moves in closer to the aircraft, being careful to remain clearly visible to the pilot at all times. When the hookup has been completed and the hookup team is in the clear, the signalman signals the pilot to begin raising his helicopter slowly until the slack is taken out of the sling. As the helicopter is taking slack out of the sling, the ground crew must prevent any fouling of the sling arrangement with the lift. If fouling occurs and cannot be corrected immediately, the pilot is signaled to release his hook, is waved off, and then signaled to make a new approach. When the helicopter has taken a strain on the lift, the signalman signals for takeoff. At the landing site, the ground crew must watch the cargo release hook very closely. If the cargo release hook fails to release, the helicopter must be held in the hover position until the hook is cleared. Clearing the hook will at times involve clearing the cargo release hook from the aircraft; this will be accomplished by the helicopter crew with the assistance of the ground crew. Needless to say, coordination and a clear understanding of all signals is mandatory between the helicopter crew and the ground crew at all times.

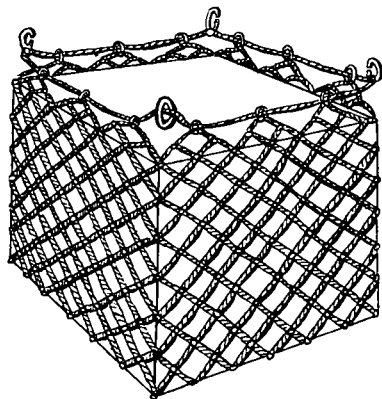
95. Cargo Nets

(figs. 21 and 22)

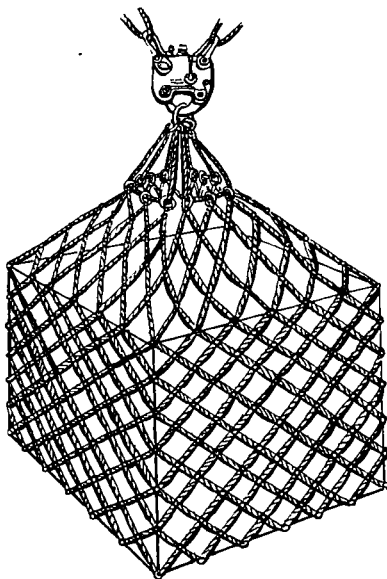
a. Cargo nets are used extensively for carrying external loads by helicopter. The cargo net functions as a container for cargo



(1)



(2)



(3)

- (1) IN POSITION FOR LOADING
WITH SIDES COLLAPSED.
- (2) THE SLING CABLE IS ASSEMBLED
WITH HOOKS AT THREE CORNERS
AND A LARGE RING AT THE
FOURTH CORNER.
- (3) THE HOOKS ARE SNAPPED ONTO
THE LARGE RING TO FORM THE
SLING AS SHOWN.

Figure 21. Procedure for use of cargo net.

during the delivery cycle. Cargo delivered in cargo nets is generally limited to loose cargo, but cargo nets may also be used for delivery of unitized cargo.

b. When the helicopter lift capability exceeds the weight and/or volume of cargo that can be stowed in one cargo net, clusters of cargo nets are made up into one external load. When cargo nets are clustered, the angle between the cargo net slings must be minimized to reduce crushing effects.

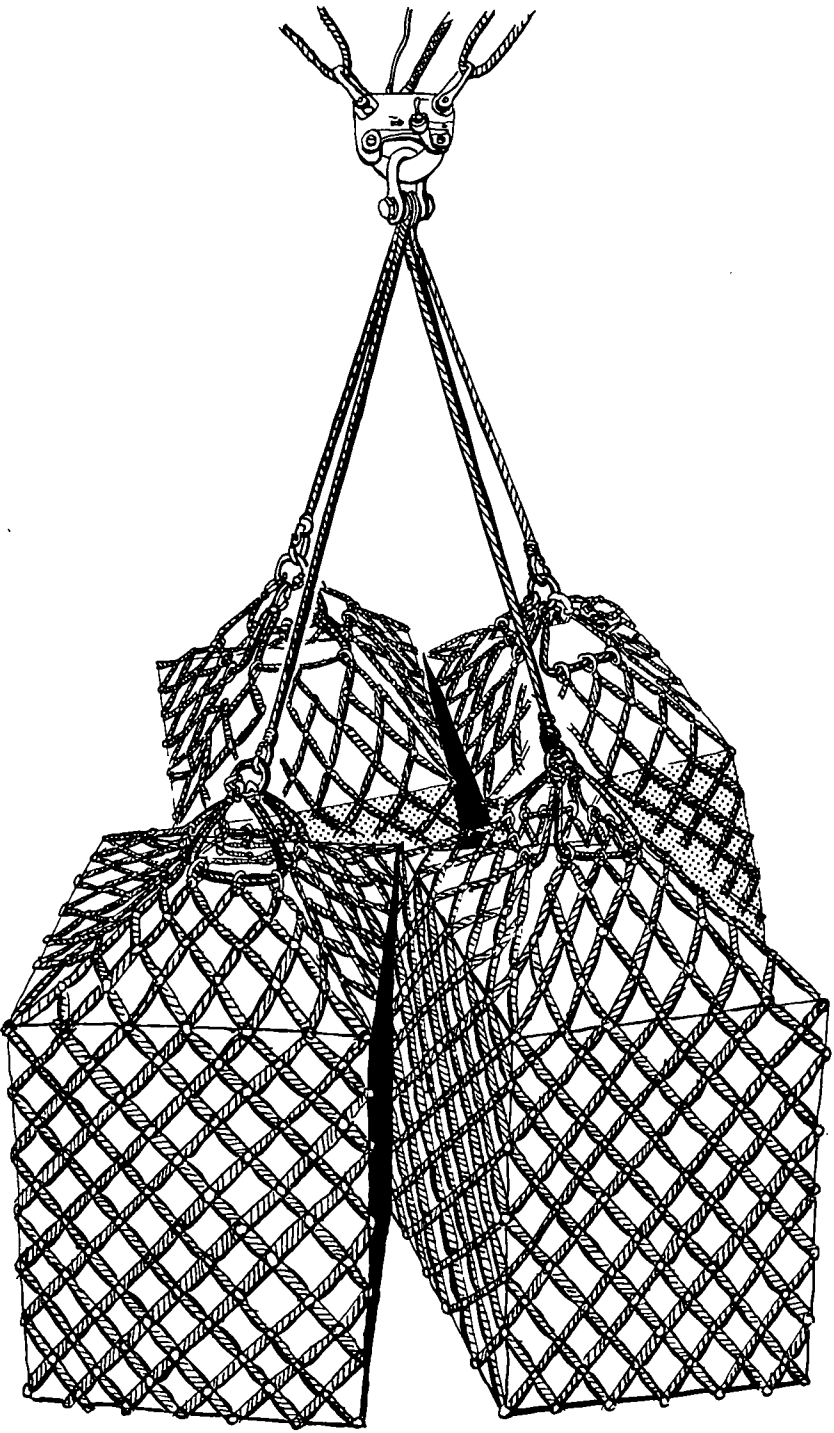


Figure 22. Cargo nets clustered.

c. Cargo nets presently available and suitable for use by helicopter units are constructed of wire (5,000-pound capacity) and nylon (3,000-pound capacity). The numbers, by type, of these nets employed in an amphibious operation will be determined by the mission requirements and availability of the nets. For detailed descriptions of these two types of nets, see FM 1-100.

96. Cargo Slings

(fig. 23)

a. The standard suspension slings used in slinging cargo in airborne operations are used for slinging supplies and equipment for delivery by helicopter. These suspension slings consist of three types manufactured in eight lengths. The three types available are standard, two-loop, and three-loop slings. The standard and three-loop slings are interchangeable and may be used on the same lift. The two-loop sling should not be used on the same lift with standard or three-loop slings because of its greater stretch. The standard suspension slings are manufactured in lengths of 2, 5, 7, 8, 9, 11, 12, and 20 feet.

b. When using slings to secure external loads, there are three basic factors that must be met. Each leg of the sling assembly must be capable of lifting the load, the load must be slung at the proper distance under the fuselage, and the load must assume the proper attitude in flight. The proper attitude of a load is that position or plane at which the load has the best stability during flight. The proper attitude of a load will vary with the type of load and the wind conditions encountered. Some items of equipment are not stable when lifted on a level plane. For this reason, slightly longer slings are attached to one end of the load than the other. Many loads require the attachment of vanes to steady the load in flight. Detailed instructions for rigging equipment as external loads for helicopters are contained in FM 1-100.

97. Cargo Release Hooks

(fig. 24)

The cargo release hooks installed on Army helicopters can be released mechanically or electrically. The hook is opened mechanically by movement of a release toggle located on the side of the cargo helicopter by ground crew personnel. The hook is opened electrically by operating an electric switch located in the cockpit. This switch is actuated by the pilot upon touchdown. Cargo hooks that release automatically upon touchdown are available but are not normally installed on Army helicopters. The

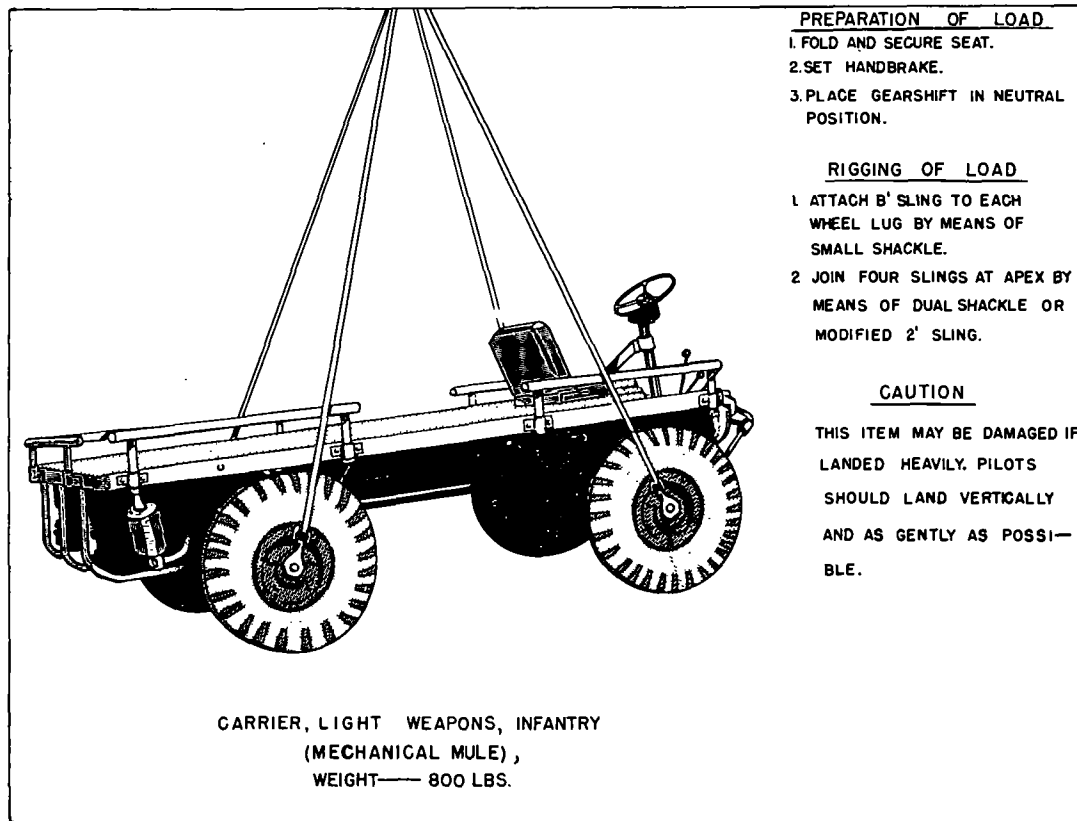


Figure 23. Typical sling load.

typical cargo release hook found on medium transport helicopters is depicted below (fig. 24).

98. Materials-Handling Equipment for Airmobile Landing Teams

In planning the logistical support of an airmobile landing team, provisions must be made for an adequate supply of materials-handling equipment. In addition to the nets and slings required to deliver supplies and equipment by external loading, materials-handling equipment is required on the LPH.

a. Helicopter units have a limited number of cargo nets available. Early in the planning phase, cargo nets and slinging material must be procured and loaded on assigned shipping during

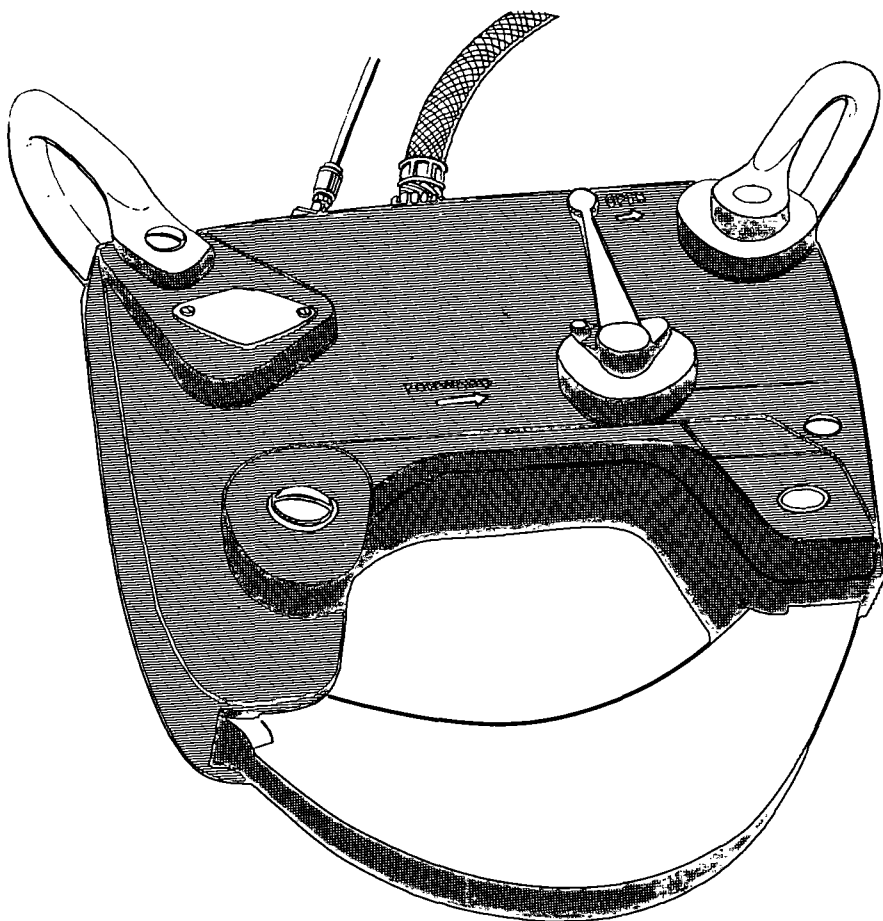


Figure 24. Typical cargo release hook.

embarkation. The cargo nets and slings organic to the helicopter units should be kept in reserve. Cargo nets and slings are assigned to the airmobile support party commander, based upon his estimate of the requirements of the airmobile landing team.

b. The materials-handling equipment required aboard ship is normally furnished by the naval transport organization. If the equipment is not available or if special equipment is required to support flight-deck cargo operations, the airmobile support party commander must provide the equipment or coordinate procurement with the transport and embarkation organization commanders.

99. Field Expedients

The problem of maintaining a continuous flow of personnel and supplies into a landing zone from the flight decks of Amphibious Assault Ships requires provisions for flexibility in the methods of loading and controlling the aircraft employed. Some of the expedients employed by the U.S. Marine Corps aboard the U.S.S. *Boxer* (LPH-4) are discussed below.

a. *Movement of Net Loads of Cargo Aboard Ship.* A considerable portion of the cargo delivered by helicopter is placed in cargo nets for external lift. Placing the cargo (loose and palletized) in nets on the flight deck resulted in flight deck congestion, required a considerable labor force, and delayed flight operations. A method of preparing netted cargo on the hangar deck and movement to the pickup point on the flight deck was required. Forklift trucks were modified to perform this function. The forks were removed from the forklift, and a rack equipped with a hook substituted. This hook can be raised to a height of 18 feet. Using the modified forklift truck allows for preparation of netted cargo loads on the hangar deck and movement of these loads to the pickup point on the flight deck without flight deck congestion. This same modified forklift truck is used for determining the proper "attitude" (par. 95) of cargo lifted by slings and has been used as MHE to replace engines in aircraft.

b. *Communications on the Flight Deck.* Due to the engine noise normal to flight deck operations, pilots are directed to a landing site within a landing zone by radio transmission. To deliver the message, flight deck control personnel are required to pass destination instructions for each aircraft to the Helicopter Direction Center (HDC) which then relays instructions via radio transmission. Due to number of messages required, relay difficulties, and volume of traffic on assigned frequencies, delays waiting for instructions are common. To expedite dispatch, a simple but

effective communication system was devised and employed. Control personnel working on the flight deck are provided with small slates (blackboards) upon which they inscribed in chalk the aircraft load and destination. When the aircraft is loaded and/or hooked up a control man holds this slate up so that the pilot can read the instructions. The pilot records these instructions on his knee pad and takes off upon signal from flight deck control personnel. When he is airborne, he advises HDC of his aircraft operational number, load, and destination. The result is increased flight deck productivity and a considerable reduction of the amount of radio traffic on assigned frequencies.

c. Enplaning Personnel. Normal procedure is to refuel aircraft after three round trips to the landing zone. As the fuel load decreases the payload in numbers (weight) of personnel is increased. Personnel enplaned must wear life jackets during flights over water and have seat belts secured before the aircraft is launched; and a passenger manifest is required for each aircraft. These factors combined caused considerable difficulty in following the load and time schedules established by landing plans. To solve these problems, support the tactical plan, and reduce the administrative workload, the following procedures have been employed successfully.

- (1) The entire landing team is serialized. This results in maximum flexibility and reduces the landing plan documentation to a few pages of simply computed figures. Numbers of personnel enplaned in each aircraft can be increased or decreased with changes in aircraft-lift capability.
- (2) Life jackets or belts are furnished by the helicopter unit. By doubling the life jacket allowance for each aircraft, delays in loading are reduced. Life jackets are donned by heliteam personnel in the ready area on the flight deck, and personnel enplane with life jackets secure. When the aircraft clears the water area, the life jackets are collected by the crew chief or placed in a bag for return to the ship. Upon arrival back on the LPH the crew chief delivers the bag of life jackets to the ready area and picks up an empty bag. This cycle is repeated until all personnel are landed.
- (3) Soldiers with field packs and life jackets secured to their backs have considerable difficulty locating and fastening seat belts. By equipping aircraft with two male seat belts on one side of each seat and two female seat belts

on the other side, a soldier picking up one strap from each side of the seat can strap in rapidly.

- (4) Preparing passenger manifests in advance is difficult, considering the variations in passenger loads; yet a manifest is required. To prepare accurate manifests and reduce "down time," each man scheduled to enplane is given a card upon which is typed his name, rank, serial number, and organization. Personnel are assembled on the hangar deck at the foot of the ladder leading to the flight deck and formed into heliteams by a representative of the organization S3. When light transport helicopters are employed, the heliteam size will vary between 7 and 12 men, depending upon the fuel load in aircraft. As the S3 representative forms heliteams, he takes the enplaning card from each man and places it in an envelope. He marks the landing serial, number of men, and organization on the envelope. The heliteam then proceeds up the ladder to the flight deck. Upon arrival in the ready area, a guide receives the envelope, issues life jackets, and checks packs and life jackets for security. When the team is called to enplane, the guide leads them to the assigned enplaning point. The heliteam enplanes, and the guide marks on the envelope the aircraft hull number and returns the envelope to a man in the ready area who indicates the departure time of the flight on the envelope and forwards the envelope by messenger to Tac-Log. At Tac-Log the envelopes are used to check off serials and are retained as a passenger manifest in case of aircraft failure.

d. Cargo Slings. The delivery of supplies to a landing zone is often complicated by a shortage of cargo nets and slings. In addition to shortages of this type material, certain vehicles (Mules) cannot be rolled into position with standard slings attached. The U.S. Marine Corps has employed a sling, constructed as a field expedient, on approximately 150 different types of lifts without sling failure. It has speeded up flight deck cargo operations and reduced materiel costs considerably. The sling used is constructed of 3-inch manila line, 45 feet in length, spliced into an endless loop. The sling is attached as a choker on palletized cargo, and to sling vehicles one sling is attached to each end of a vehicle. These slings can be attached to a load easier and faster than standard slings and cargo nets and allow for preparation of lifts on the hangar deck. The use of these slings results in increased flight deck productivity and flexibility in lift preparation.

SECTION X

LOADING HEAVY VEHICLES

100. General

Heavy vehicles, as used in this manual, include self-propelled artillery, tanks, and other tracked and wheeled vehicles whose gross weight exceed the safe working load of the cargo booms installed on hatches of U.S. Navy transports (APA and AKA).

101. Landing Plan Effect on Shipping Requirements

The plans for delivering heavy vehicles to assault beaches will be a determining factor in selecting the type amphibious ships required to support the landing plan.

a. When large numbers of heavy vehicles are to be landed early in the assault phase, it is preferable to preload these heavy vehicles in assault craft and deliver the preloaded assault craft to the objective area in LSD-type shipping.

b. When a few heavy vehicles are required early in the assault phase, the vehicles may be loaded in transports (AKA or APA) for movement to the objective area. Upon arrival in the objective area, the vehicles are unloaded from the ship by jumbo cargo gear and landed in the transport's assault craft. The assault craft deliver the heavy vehicles to the beach as required.

c. When the landing plan provides for landing tank and artillery organizations after a beachhead has been secured, heavy vehicles will normally be delivered to the objective area and landed on assault beaches by LST.

102. Loading Plans

a. Loading of organizations such as tank battalions and self-propelled artillery batteries aboard ship is complicated by two factors:

- (1) The number, size, and weight of organic vehicles limit the types of ships that can be employed, as well as the space aboard each ship that can be used.
- (2) The large quantity of fuel and ammunition required to keep these organizations in action during combat re-

quires a large amount of supply shipping space for relatively small organizations.

b. Shipping estimates and requirements are calculated at the earliest practicable time in order to expedite preparation of loading plans. Prior to the arrival of assault shipping at the embarkation area, detailed embarkation and loading plans are prepared for each organization equipped with numerous heavy vehicles. Unit officers prepare these plans in conjunction with embarkation officers and Navy commanders concerned. The plans include provisions for assignment of individual tanks and artillery pieces, tank and artillery crews, and supplies to specific ships.

c. Unit commanders are responsible for supervising and controlling preparation, marking, and protection of their equipment and supplies. All equipment and supplies are prepared for loading, deepwater fording equipment is installed, and a final inspection made to insure that vehicles are ready for combat prior to loading.

d. The movement of organizations equipped with heavy vehicles to the embarkation area is normally directed by a separate march order published as an appendix to the embarkation plan. The embarkation plan is an annex to the operation plan.

e. Loading plans must provide for retaining crew integrity. Crews and maintenance personnel should always be embarked with tanks and artillery.

103. Loading

When available, LST, LCU, or LSD should be used to deliver heavy vehicles to the objective area. Heavy vehicles may be driven on and off these types of ships. The availability of shipping, however, may require that heavy vehicles be loaded aboard transport-type shipping (APA and AKA).

a. Loading APA and AKA Shipping.

- (1) Heavy vehicles are loaded on APA- and AKA-type shipping only in the hatches equipped with heavy-lift (jumbo) cargo gear.
- (2) Heavy vehicles are lifted aboard ship from a dock or from assault craft alongside the ship. When special slings are required to lift vehicles, the slings must remain aboard the ship on which the vehicle is loaded. In lifting heavy vehicles from the dock or from assault craft, the cargo hook must be centered over the load before the vehicle is lifted. Lifting with the cargo hook off center may result in vehicle damage and/or personnel injury.

- (3) In combat loading, heavy vehicles are normally stowed in the lower hold. If unloading priorities require loading heavy vehicles at deck levels other than the lower hold, the vehicles are normally stowed in the square of the hatch.
- (4) Heavy vehicles are secured in vehicle stowage spaces in accordance with shipboard standing operating procedures. The ship will normally furnish the material required to secure the vehicles. It may be necessary for the embarking landing force organization to furnish lashing and blocking gear when the securing of vehicles will require more gear than is available aboard ship. When the landing force organization is required to furnish lashing gear, the ship combat cargo officer will advise the team embarkation officer of these requirements early in the planning phase.

b. Loading LSD-Type Shipping. Heavy vehicles may be loaded on LSD shipping in three ways: the LSD is dry loaded by driving vehicles into the cargo well; vehicles are preloaded in assault craft and the preloaded craft enter the cargo well of the LSD in the stream; and loading the LSD employing a water barrier installed in the cargo well that allows for dry loading vehicles along with a limited number of preloaded assault craft.

- (1) *Dry loading.* Dry loading heavy vehicles in an LSD is accomplished by two methods:
 - (a) The LSD is berthed stern to a dock and vehicles are loaded by driving them aboard over the stern ramp.
 - (b) The LSD is anchored in the stream and loaded by using LCM (8)- or LCU-type assault craft. The LSD floods down sufficiently to allow the assault craft to "beach" on the extreme afterend of the cargo well. The assault craft "beach," and heavy vehicles are driven off the assault craft into the cargo well of the LSD.
- (2) *Preloaded assault craft.* The landing craft employed in an amphibious operation are furnished by the amphibious task force commander. The type assault craft employed will be determined by mission requirements, beach gradient in the objective area, and weather factors.
 - (a) The numbers of preloaded assault craft, capable of lifting heavy vehicles, that can be loaded in an LSD will vary with the class LSD available. For planning purposes, the following capacities may be used: 3 LCU

(1466 class); or 2 LCU (1610 class); or 9 LCM (8); or 18 LCM (6); or 5 BARC.

- (b) Heavy vehicles are positioned in assault craft with the driver facing the ramp of the assault craft. Vehicles are normally backed into the assault craft while the assault craft is beached. When suitable beach facilities are lacking, or when the type vehicle to be loaded is not easy to back aboard, vehicles may be loaded in the assault craft by heavy-lift cranes.
- (c) The preloaded assault craft are positioned in the cargo well of the LSD while the LSD is flooded down. Movement, positioning, and control of the assault craft are directed by the ship's first lieutenant or docking officer. Ship personnel become responsible for control and security of the assault craft when the craft pass over the stern ramp of the LSD.
- (3) *Combination of dry loading and preloaded assault craft.* When necessary, an LSD loads heavy vehicles using a combination of dry-loading and preloaded assault craft. Vehicles are loaded in the forward part of the cargo well, as described in *b*(2) above. A water barrier is then secured in place. After the water barrier is installed, the LSD is flooded down, and one LCU preloaded with vehicles is secured aft of the water barrier. Upon arrival in the objective area, the LCU shuttles the vehicles loaded on the LSD ashore.

c. Loading Ramp-Type Shipping. Ramp-type shipping organic to naval organizations capable of lifting heavy vehicles are Landing Ship, Tank (LST) and Landing Craft, Utility (LCU).

- (1) The LCU is loaded on the beach by backing heavy vehicles aboard over the bow ramp. These landing craft can also be loaded by use of shore or floating cranes spotting vehicles on their deck. When loaded by heavy-lift crane, the loading plan must provide for vehicles moving over the LCU bow ramp under their own power without requirement for extensive maneuvering.
- (2) The LST is loaded on the beach by backing or driving vehicles aboard over the bow ramp. The newer classes of LST are equipped with a turntable that allows turning of vehicles on the tank deck.
 - (a) In loading heavy vehicles aboard LST the beaching tonnage of the ship is the basic planning factor.
 - (b) To retain beaching capability and at the same time lift the full ocean tonnage, LST-type ships often carry

an LCU or amphibious vehicles on the main deck. In the objective area, the LCU and/or amphibious vehicles are launched prior to beaching the LST.

- (3) Whenever possible, loading of heavy vehicles aboard ramp-type ships on the beach should be conducted on a rising tide. Landing ships will beach with ballast tanks full. After the ship has been loaded, the ship will empty its ballast tanks and retract.

SECTION XI

DEBARKATION

104. General

As used in this manual, debarkation is the unloading of the landing force from the amphibious task force transport shipping. The completed loading plan is, in effect, a debarkation plan. Priorities assigned to equipment and supplies in the preparation of the loading plan determine the sequence in which the equipment and supplies are unloaded. Personnel have been embarked at deck levels and organized into boat teams and heliteams to support the landing plan. For information required to prepare and implement the landing plan, see FM 31-12 and FM 31-13.

105. Responsibility

The amphibious task force commander is responsible for unloading of the landing force at the objective area in the planned order and priority and delivery to the proper beaches or landing zones. The amphibious task force commander may delegate control and coordination of unloading operations to subordinate naval commanders, in which case the commander of each Navy echelon, including the commanding officer of each ship, becomes responsible for unloading personnel and cargo.

106. Landing Force Debarkation Officers

The landing force debarkation staff consists of the Tac-Log group (par. 19) assigned to the control ships at task force, group, and unit levels and debarkation officers assigned to individual ships.

a. The Tac-Log group at task force, group, and unit levels, working with their naval counterparts on the central control ship, assistant central control ship, and primary control ship, exercises staff supervision over the landing force debarkation.

b. On each ship, the team embarkation officer, in coordination with the ship combat cargo officer, assumes responsibility for debarking personnel and unloading cargo. The team embarkation officer now becomes troop debarkation officer, and the ship combat cargo officer becomes the ship debarkation officer. Acting for the

commanding officer of troops, the troop debarkation officer advises the ship debarkation officer of the team's debarkation support requirements and stations a hatch checker at each hatch to maintain a record of cargo unloaded and the beaches or landing zones to which the cargo is dispatched. When debarkation support requirements exceed the capabilities of the ship, the troop and ship debarkation officers, acting jointly, make their support requirements known to the Tac-Log group on the primary control ship.

107. Naval Debarkation Officers

The naval debarkation staff consists of officers assigned to the various control ships and the ship debarkation officers assigned to each ship. In addition to a detailed knowledge of the landing plan and logistical support plans, the Navy officers assigned to control ships must be thoroughly familiar with the hydrography of the objective area, the fire support plan, and the availability and capabilities of the various types of surface and aerial means assigned.

a. The Navy control group aboard the central, assistant central, and primary control ships, in coordination with the landing force Tac-Log group stationed aboard the control ships, controls the surface portion of the ship-to-shore movement. Control is exercised through naval communications nets established within the Navy control group, down to and including waveguides. Aircraft employed for ship-to-shore movement are controlled by the tactical air control center (TACC). The tactical air control center delegates the control of helicopters employed in the assault to the helicopter direction center (HDC), a subordinate control agency of the tactical air control center. For detailed information regarding the operation of these control agencies, see Navy Publication, NWP 22, FM 31-12 and FM 31-13.

b. The ship combat cargo officer is normally assigned duty as the ship debarkation officer. The ship debarkation officer is responsible for debarking troops in accordance with the debarkation schedule and unloading cargo in accordance with the unloading plan. One of his primary functions is to have the proper ship-to-shore assault craft at the designated debarkation station when required. During debarkation, his duty station is on the ship's bridge. He maintains telephone communication with each debarkation station and each cargo hatch. He maintains a check-off list indicating craft designation by type, destination, load, and departure time. With the checkoff list and information available from direct communication with each cargo compartment, he furnishes information on the unloading status and availability of

supplies to the Tac-Log group through naval control organization channels.

108. Unloading Personnel

a. A hatch officer (Navy commissioned or petty officer) supervises the unloading of cargo from cargo compartments and the loading of cargo in assault craft. He insures that the personnel operating assault craft use cleared routes and assigned check points en route to the cargo destination. Each hatch officer relays information to the ship debarkation officer pertaining to his area of responsibility, including—

- (1) Readiness to receive and load assault craft.
- (2) Status of each craft load.
- (3) Departure of craft from loading point.
- (4) Any delays in unloading.

b. A hatch talker from the ship's complement mans the telephone and relays all messages between hatch officers and the ship debarkation officer.

c. Winchmen, hatch tenders (signalmen), and boatswain's mates (riggers) are furnished by the ship's complement for each hatch. Two trained details are available for each hatch to insure continuity of cargo discharge.

d. The ship's platoon furnishes the labor (hatch gangs) required to prepare and spot cargo for unloading and attach lifting devices (slings, cargo nets, box hooks, etc.) required to transfer the cargo from the ship's cargo compartment to assault craft (par. 67a). During debarkation, the ship's platoon is supervised by the troop debarkation officer.

109. Unloading Plan

The troop debarkation officer prepares the detailed unloading plan within the framework of the landing priorities established by the embarkation team commander during embarkation. The troop debarkation officer instructs the hatch gangs, formed from the ship's platoon, concerning the contents of the unloading plan and discusses the implementation of the plan in detail with each gang NCO supervisor. The unloading plan includes the following:

a. Information necessary to insure that the unloading priorities established by the embarkation team commander are followed.

b. A roster of personnel, including name, rank, and duty, of Navy personnel assigned to each cargo compartment, by shift.

c. A roster of personnel, including name, rank, and duty, assigned to the ship's platoon, by hatch gang assignment.

d. Special instructions for landing cargo in assault craft. Special instructions required for unloading LPH-type shipping are given in FM 31-13.

e. Special instructions peculiar to unloading. These instructions include such procedures as locating unitized cargo in the square of the hatch, loading trailers in the assault craft before loading the prime mover, etc.

f. Types of cargo stowed at each deck level in each hold.

g. The numbers and types of assault craft required for unloading each deck level of each hold and the sequence in which assault craft report to each hatch.

110. Ship-to-Shore Movement

For detailed information concerning planning, documentation, and operating techniques for debarkation, ship-to-shore movement, and assault, see chapter 8, FM 31-13.

APPENDIX I

REFERENCES

1. Army Regulations

AR 55-166	Utilization of Cargo Transporters in CONEX Service
AR 220-10	Preparation for Oversea Movement of Units (POM)
AR 320-5	Dictionary of United States Army Terms
AR 320-50	Authorized Abbreviations and Brevity Codes

2. Field Manuals

FM 7-100	Infantry Division
FM 21-5	Military Training
FM 21-6	Techniques of Military Instruction
FM 21-30	Military Symbols
FM 31-12	Army Forces in Amphibious Operations (The Army Landing Force)
FM 31-13	Battle Group Landing Team, Amphibious

3. Technical Manuals

TM 9-238	Deep Water Fording of Ordnance Materiel
TM 38-230	Preservation, Packaging, and Packing of Military Supplies and Equipment
TM 55-513	Transportation Corps Military Stevedoring
TM 743-200	Storage and Materials Handling

4. Department of the Army Pamphlets

DA Pam 108-1	Index of Army Motion Pictures, Filmstrips, Slides, and Phono-recordings
DA Pam 310-Series	Military Publications Indexes

5. Joint Chiefs of Staff Publications

JCS 1	Dictionary of United States Military Terms for Joint Usage
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6. Supply Bulletins

SB 38-100

**Preservation, Packaging, and Packing
Materials, Supplies, and Equipment
Used by the Army**

7. Department of the Navy Publications

NWP 22 (ch #5) Amphibious Operations

8. Department of Defense Publications

MIL-STD-129A

**Military Standard Marking for Ship-
ment and Storage**

APPENDIX II

FORMAT OF EMBARKATION PLAN

(Classification)

(Copy Number)
(Issuing Headquarters)
(Place of Issue)
(Date/Time of Issue)
(Message Reference Number)

Annex ----- (Embarkation Plan)
to Operation Plan -----

REF: (a)
(b)
(etc.)

Time Zone: ----

1. ORGANIZATION FOR EMBARKATION. (Refer to annexes as appropriate.)

a. Troop Lists. (The major subordinate troop organizations directly subordinate to the issuing headquarters and the troop units comprising each troop organization.)

b. Assignment to Shipping. (The ships in which each major subordinate embarkation troop organization is to be embarked.)

c. Berthing and Loading Schedules. (The assignment of ships to berths and the time and dates that loading of ships will be begun and completed.)

d. Advance Parties. (Instructions relative to the provision, composition, functions, movement, and administration of advance parties.)

2. SUPPLIES AND EQUIPMENT TO BE EMBARKED. (Refer to annexes as appropriate.)

a. Types and Amounts to be Embarked. (The amount of supplies and equipment, by classes of supply, to be embarked by the command as a whole.)

b. Preparation for Embarkation. (Instructions relative to packing, crating, palletizing, marking, and waterproofing.)

(CLASSIFICATION)

(CLASSIFICATION)

c. Allocation of Supplies and Equipment. (Allocation to the several subordinate embarkation troop organizations of the Supplies and Equipment to be embarked by the command as a whole.)

d. Movement of Supplies and Equipment to Embarkation Points. (Movement schedules and transportation to be used.)

3. EMBARKATION POINTS AND CARGO ASSEMBLY AREAS. (Refer to appendixes as appropriate.)

a. Assignment of Embarkation Points and Cargo Assembly Areas. (Instructions of this nature are frequently set forth in tables and diagrams attached as appendixes.)

b. Preparation of Embarkation Points and Cargo Assembly Areas. (Construction or improvements necessary to prepare the embarkation points and cargo assembly areas for rapid and orderly handling of equipment and supplies. Typical items covered are construction or widening of roads; clearing of warehouses and open storage areas; and construction of piers, ramps, and beaching slots.)

c. Assignment of Mechanical Loading Devices. (Instructions relative to the provision, allocation, operation, and maintenance of roller conveyors, forklift trucks, tractors, cranes, pallets, and other materials-handling equipment.)

4. CONTROL. (Refer to annexes as appropriate.)

a. Embarkation Control Offices. (Instruction relative to responsibility for establishment, locations, times of opening and closing, and functions.)

b. Traffic Circulation and Control. (Routes, direction of circulation, priorities, speeds, restrictions on lights, and location of traffic control posts.)

c. Security Posts. (Security measures to protect against weather, fire, pilferage, and sabotage, including the establishment of security posts and the imposition of restrictions on smoking and open flames.)

d. Communications. (Instructions relative to radio, wire, and messenger service between embarkation points, cargo assembly areas, staging areas or camps, shipping control or other naval agencies, embarkation control offices, security posts, and traffic control posts as appropriate.)

5. MOVEMENT AND EMBARKATION OF PERSONNEL. (Refer to annexes as appropriate.)

(CLASSIFICATION)

(CLASSIFICATION)

a. Movement Schedule. (Dates and times of movement, and transportation to be used.)

b. Embarkation Schedule. (Dates and times of embarkation. This schedule is frequently combined with the movement schedule.)

c. Uniform, Equipment, and Baggage. (Uniform to be worn by embarking troops, individual equipment to be carried, and baggage allowances.)

6. MISCELLANEOUS. (Any necessary instructions not covered elsewhere in the plan or order, such as special responsibilities of embarkation troop commanders, special loading instructions relative to particular items or types of cargo, special vehicles to be provided at embarkation points during loading, and special reports required during loading or on completion of loading.)

7. ACKNOWLEDGE. (This paragraph is normally included to assure that responsible personnel have received the embarkation plan.)

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Maj Gen

APPENDIXES:

- I. Embarkation Organization and Shipping Assignment Table
- II. Loading Schedules
- III. Advance Parties
- IV. Supply
- V. Marking and Crating
- VI. Cargo Movement
- VII. Embarkation and Cargo Assembly Areas
- VIII. Movement Control
- IX. Communications
- X. Personnel Movement
- XI. Embarkation Schedule

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(CLASSIFICATION)

APPENDIX III

TYPICAL SHIP'S LOADING CHARACTERISTICS

PAMPHLET

1. Contents

The ship's loading characteristics pamphlet contains, in a concise and convenient form, all data of interest to embarkation organizations to be embarked. It is essential that the data be complete and accurate, as the detailed plans for embarkation and loading may frequently be prepared well in advance of the arrival of the ship or of the ship combat cargo officer at the embarkation area.

2. Procurement of Ship's Loading Characteristics Pamphlets

a. When the shipping allocated to a landing force consists of naval amphibious ships, the required ship's loading characteristics pamphlets are furnished to the landing force embarkation staff by the naval transport organization.

b. When Military Sea Transportation Service (MSTS) shipping is allocated to the landing force to augment naval shipping, ship's loading characteristics pamphlets pertaining to the ships allocated to the landing force are furnished on request to the landing force embarkation staff by the MSTS representative assigned to the Army terminal command supporting the embarkation. When MSTS shipping is employed, the third mate performs the duties normally performed by the ship combat cargo officer on naval shipping. These duties include verification of the accuracy of the ship's loading characteristics pamphlet furnished to the team embarkation officer.

3. Typical Ship's Loading Characteristics Pamphlet

The following pages of this appendix constitute a typical ship's loading characteristics pamphlet.

SHIP'S LOADING
CHARACTERISTICS PAMPHLET

U.S.S. PAUL REVERE

APA-248

APPROVED: 20 DEC 1958

R. B. Erly
R. B. ERLY
Captain U. S. Navy
Commanding

PREPARED BY:

N. J. Beckman
N. J. BECKMAN
1st Lt USMC
Combat Cargo Officer

RECORD OF CHANGES

CHANGE NO.	DATE OF CHANGE	DATE CHANGE MADE	SIGNATURE OF PERSON MAKING CHANGE

TRANSPORT CHARACTERISTICS

1. PRINCIPAL CHARACTERISTICS

Type of hull	C4-S-1A
Length overall	573 ft.
Beam overall	76 ft.
Maximum draft	26 ft.
Potable fresh water capacity	142,000 gals.
Daily distiller capacity	48,000 gals.

2. BERTHING ACCOMMODATIONS

a. <u>Flag officers</u>	<u>No. Bunks</u>	<u>Space</u>
Flag officer	1	02-105-8-L
Chief of Staff	1	02-105-3-L
Staff officer	1	02-105-2-L
Staff officer	1	02-105-1-L
Total	4	
b. <u>Troop officers</u>		
Asst div commander or embark team CO	1	01-105-6-L
Chief of staff or embark team XO	1	01-105-7-L
Staff officers	2	01-105-0-L
Staff officers	2	01-105-3-L
Troop officers	2	1-146-2-L
Troop officers	2	1-149-2-L
Troop officers	45	2-64-2-L
Troop officers	45	2-64-2-L
Total	100	
c. <u>Troop enlisted</u>		
Staff NCO's	33	2-95-0-L
Staff NCO's	15	2-144-2-L
Enlisted	144	1-18-01-L
Enlisted	120	2-36-01-L
Enlisted	148	2-184-01-L
Enlisted	183	3-36-01-L
Enlisted	144	4-36-01-L
Enlisted	351	4-82-0-L
Enlisted	238	3-160-0-L
Enlisted	176	4-184-01-L
Total	1552	

d. Troop office space

<u>Space</u>	<u>Furnishings</u>
2-42-3-Q (Troop Office)	1 desk, 3 chairs, 1 file cabinet, 1 ship's service telephone. Space as available in this compartment for two or three portable field desks.
2-160-0-Q (Troop Admin Office)	5 desks, 7 chairs, 3 file cabinets, 1 table, 1 wall safe, 1 ship's service telephone.

e. Troop message center

There has been no space on the ship specifically designated as a troop message center. There is, however, a very small office adjoining troop radio central that could possibly be used as a message center.

f. Radio equipment (available for troop use)

(1) Major equipment located in troop radio central:

<u>TYPE</u>	<u>NO.</u>
AN/GRC-10	2
AN/SRA-21 (XN)	1
AN/SRC-10Y	1
AN/SRC-11Y	1
AN/SRC-12Y	4
AN/SRR-13A	3
AN/TCC-3	2
AN/TCC-14	4
TCS-12	4

(2) Major equipment made available by switchboard in troop radio central, but not actually located in that space.

<u>TYPE</u>	<u>NO.</u>
AN/GRC-27A	3
AN/SRC-11Y	1
AN/SRC-14Y	3
AN/URT-7C	1
TED/8	5

(3) Auxiliary equipment located either in troop radio central or troop operations:

<u>TYPE</u>	<u>NO.</u>	<u>LOCATION</u>
F-157-URT	2	Troop radio central
AN/SRA-12A	1	Troop radio central
C-1138/UR	11	Troop radio central (5) Troop operations (6)
MX-1743/SRC	4	Troop radio central
MX-1986/SRC	6	Troop radio central

<u>TYPE</u>	<u>NO.</u>	<u>LOCATION</u>
SB-82/SRR	10	Troop radio central
SB-83/SRT	4	Troop radio central
SB-315(X)/U	7	Troop radio central (5)
		Troop operations (2)
TT-47/UG	3	Troop operations (2)
		Wardroom (1)
TT-71/UG	1	Troop operations

(4) Remoting equipment and remotes:

(a) Remoting equipment located in troop radio central:

1. AN/SRA-21 (XN-1) (Voice)
2. SB/82/SRR (Audio)
3. SB/83/SRT (CW)

(b) Remotes from SN/SRA-21 (XN-1)

<u>TYPE</u>	<u>NO.</u>	<u>LOCATION</u>
RHS	#27-#30	Troop radio central
RHS	#31-#36	Troop operations
RHS	#37-#51	SACC
RNHS	#3	SACC

(c) Remotes from bank of nine SB-82/SRR's.

<u>DESCRIPTION</u>	<u>LOCATION</u>
1. Five trunks to AN/SRA-21 (XN-1)	Troop radio central
2. Three trunks to manual switchboard in ship's radio central	Ship's radio central
3. LVP in troop radio central	Troop radio central
4. LOP1B-5B in troop radio central	Troop radio central
5. LOP-6C	Troop radio central
6. RGHP #1-#5	SACC
7. RGHP #6-#7	Troop operations

(d) Remotes from bank of four SB-83/SRT's.

<u>DESCRIPTION</u>	<u>LOCATION</u>
1. Five trunks to AN/SRA-21 (XN-1)	Troop radio central
2. Three trunks to manual switchboard in ship's radio central	Ship's radio central
3. SB-315 (X)/U	Troop radio central
4. LOP #1-#4	Troop radio central
5. RGHP #1-#5	SACC
6. RGHP #6-#7	Troop operations

g. Head and washroom facilities

SPACE	SHOWERS	TOILET	URINALS	WASH
		SEATS		BASINS
2-24-01-L	10	19	11	33
2-50-2-L	3	5	2	8
2-57-3-L (officer)	3	5	2	6
2-57-4-L (officer)	3	5	2	6
2-91-2-L (SNCO)	1	2	1	3
2-172-4-L	5	9	5	15
2-184-2-L	7	13	7	23
4-82-3-L	5	15	8	24

h. Troop laundry facilities

Ship's laundry will be available for troop's use, provided the commanding officer of troops furnishes troop personnel to operate the equipment. The troop personnel required to operate ship's laundry will be based on 1 per 50 troops embarked. Ship's laundry personnel will supervise the operations while troop personnel are operating the equipment. The ship's laundry will not be responsible for clothing being damaged or lost while being laundered. Troop laundry will be done once a week. Time of pickup and delivery will be published in the ship's plan of the day when the ship gets under way from the point of embarkation.

i. Troop barber facilities

The ship has a separate troop barber shop (5-137-2-Q). Facilities include three chairs, two benches, two cabinets, one lavatory, and adequate barbering equipment. The ship will be unable to furnish barbers for the troops; therefore, qualified barbers must come from among troop personnel.

3. TROOP CARGO AND EQUIPMENT ACCOMMODATIONS

Bale cubic capacity	138,974 cu ft
Troop vehicle capacity	10,487 sq ft
Troop ammunition capacity	14,233 cu ft
Troop gasoline capacity	12,796 cu ft
Troop gasoline capacity (55 gal. drums)	876 drums
<u>Troop diesel and kerosene capacity</u>	

Suitable stowage space can be made available from designated gasoline spaces in lower hold #6. Gasoline, diesel, and kerosene cannot be stowed in the same compartment.

Troop pyrotechnic locker capacity

There has been no space so designated for troop use on this ship. Troop ammunition spaces in lower hold #6 could be used for such stowage.

Cargo-handling equipment

<u>Number of:</u>	<u>AUTHORIZED</u>
Cargo nets	
10' × 10' (nylon)	25
12' × 12' (nylon)	150
10' × 10' (wire)	4
Cargo mats	
6' × 6'	2
4' × 4'	2
Vehicle slings	
16-ton capacity with spreader	3
5-ton capacity with wood spreader	3
Hydraulic jacks (dolly type for vehicles)	
10-ton capacity	2
Pallet slings (without spreader)	
4' × 6' pallet	6
Chime hooks (4-barrel capacity)	5
Roller conveyors (aluminum, gravity)	
122" × 12" with 9" rollers	20

Vehicle lashing assemblies

BUSHIPS allowance list does not provide for above equipment. Requested change to allowance has been submitted to include cargo-securing gear of adequate types and numbers.

4. TROOP CARGO SPACE

<u>HOLD #</u>	<u>PLATFORM</u>	<u>HATCH OPENING</u>	<u>MINIMUM CLEARANCE</u>	<u>NO. OF BOOMS, CAPACITY</u>	<u>MAXIMUM</u>	
					<u>SQ. FT.</u>	<u>CU. FT.</u>
2	LH	24' × 10'	12' 4"	2 8T	1,256	15,633
3	2	40' × 30'	11' 6"	1 60T; 1 10T	3,620	43,024
3	LH	40' × 30'	12' 0"	1 60T; 1 10T	2,780	33,420
4	2(G)	10' × 10'	6' 2"	1 30T; 1 10T	1,200	7,404
4	LH(A)	9'3" × 9'3"	5' 8"	1 30T; 1 10T	1,930	10,935
6	2	40' × 30'	6' 11"	1 60T; 1 10T	2,831	19,868
6	LH(G) (Port)	12'6" × 9'6"	8' 2"	1 60T; 1 10T	330	2,696
6	LH(G) (Strbd)	12'6" × 9'6"	8' 2"	1 60T; 1 10T	330	2,696
6	LH(A) (Port)	10' × 10'	8' 2"	1 60T; 1 10T	219	1,649
6	LH(A) (Strbd)	10' × 10'	8' 2"	1 60T; 1 10T	219	1,649
Totals:					<u>14,715</u>	<u>138,974</u>

5. VEHICLE CAPACITIES OF VARIOUS CARGO SPACES

<u>DECK HOLD</u>	<u>TRUCK ¾-TON</u>	<u>TRUCK, ¾-TON WITH TRAILER</u>	<u>TRUCK 2½-TON</u>	<u>TRUCK, 2½-TON WITH TRAILER</u>
#2 HOLD	6	3	None	None
#3 HOLD				
SECOND PLATFORM	26	15	11	8
LOWER HOLD	18	11	9	6
#6 HOLD				
SECOND PLATFORM	18	10	9	6
Totals:	68	39	29	20

6. LANDING CRAFT

LCM(6) 7 LCVP 12 LCP(L) 3

7. The USS PAUL REVERE is the first type design APA in the U.S. Navy. Many of the general ship and cargo-carrying capacities are different from those of the C-3 type APA. These characteristics are listed below and will help in planning the loading of the ship.

a. Helicopter Landing Platform

The helicopter elevator stops at the following levels: helicopter deck, main deck, second platform, #6 hold. The elevator can be used for rapid routing of casualties and transfer of high-priority helicopter-transportable cargo from the #6 hold to the helicopter deck. Use of the elevator for facilitating distribution of D-1 supplies may be of some timesaving value if these types of supplies are stored in #6 hold.

b. Hospital Facilities (Medical, Dental).

All of the modern equipment and design of a shore station hospital have been incorporated into the PAUL REVERE hospital. The PAUL REVERE has the capability of caring for 296 casualties by virtue of three battle dressing stations, which can be converted into emergency operating rooms. Adequate casualty berthing is provided since the battle dressing stations are located in troop berthing compartments.

<u>STATION</u>	<u>SPACE</u>	<u>NO. OF BUNKS</u>
Forward battle dressing	2-36-01-L	120
Main battle dressing	1-85-01-L (hospital spaces)	28
After battle dressing	2-184-01-L	148
	Total	296

c. Hatches.

- (1) All of the four holds usable for troop cargo are equipped with quick-opening (accordian-type) hatch covers which can be opened in 10 minutes.

- (2) It should be noted that, because the location of the hatch cover provides access to lower hold #4 (troop ammunition), it will be impossible to unload troop drum gas and troop ammunition simultaneously.

d. Special Loading Instructions.

In order to clarify responsibilities and prevent misunderstanding, the following information should be disseminated to all personnel engaged in loading and unloading the PAUL REVERE:

- (1) The ship's executive officer will be in general charge of loading and unloading. The following personnel assist the executive officer:

(a) The ship combat cargo officer will insure that the ship's characteristics pamphlet is thoroughly understood by the team embarkation officer, advise and assist him in the preparation of the loading plan, and submit the approved corrected copy of the loading plan before loading begins (whenever possible, 24 hours in advance). Any problems arising during loading or unloading should be brought to the attention of the combat cargo officer. The combat cargo officer will remain on board ship during loading and unloading and will be available to the unit embarkation officer at any time.

- (b) The ship's first lieutenant is responsible for the stowage of cargo. He will:

Supervise and insure proper stowage, care, and handling of all cargo.

Insure that safety precautions and regulations are enforced.

Direct all cargo-handling personnel.

Be assisted by:

Ship's boatswain

Gunnery officer

Deck division officers

Boatswain mate chiefs

Hatch captain's of each hold

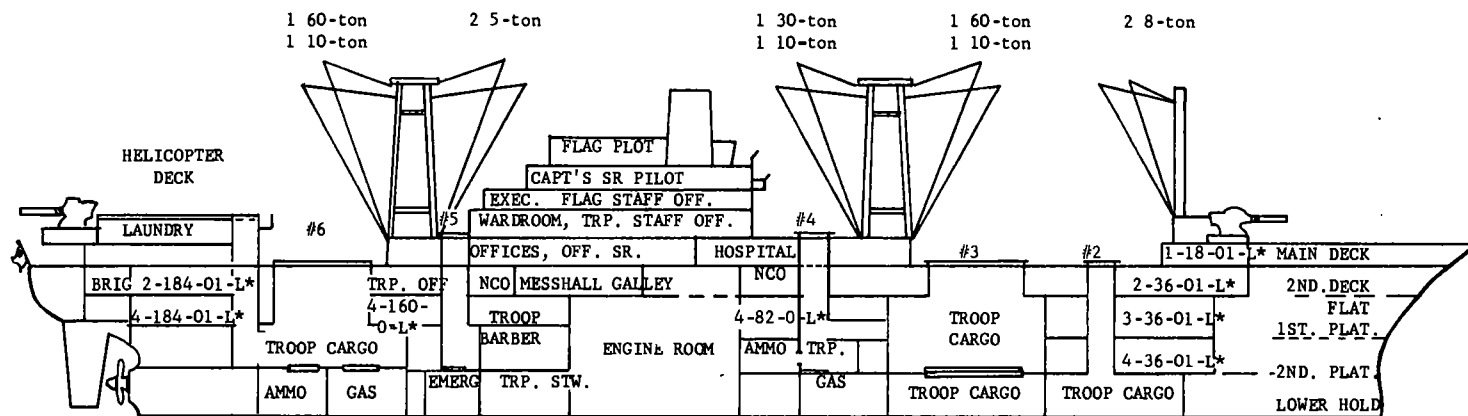
- (c) The gunnery officer will supervise stowage of all explosives.

- (d) All personnel engaged in loading and unloading the ship will cooperate to the fullest with the above-listed officers and petty officers.

- (2) All cargo-handling equipment will be operated by ship's personnel.

- (3) The embarkation team will furnish the necessary dock equipment, technical assistance, dunnage, personnel, tools, and material to properly shore and secure cargo.
- (4) After approval, no change will be made in the loading plan without concurrence of the commanding officer of the PAUL REVERE and the commanding officer of troops.
- (5) All cargo must be properly marked to enable rapid identification during loading and unloading.
- (6) All gasoline containers must be inspected for leaks before being loaded aboard.
- (7) Before leaving the ship, the embarkation officer will insure that:
 - (a) The troop cargo and berthing compartments are clear of troop equipment and supplies and are policed thoroughly.
 - (b) The ship's platoon know to whom they are to report after arrival ashore.

USS PAUL REVERE (APA 248)



Note: *DENOTES TROOP ENLISTED BERTHING

DEBARKATION STATIONS

LANDING CRAFT
LCM(6)..... 7
LCVP.....12
LCP(L)..... 3

RED TWO

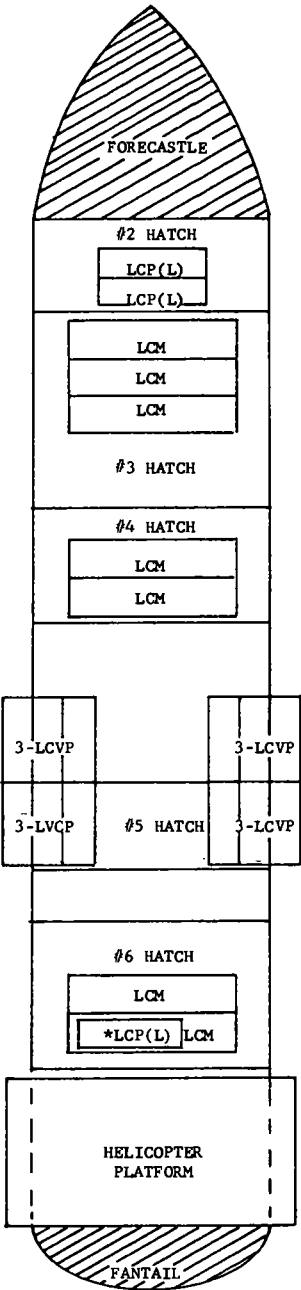
WHITE FOUR

BLUE SIX

YELLOW EIGHT

GREEN TEN

BLACK TWELVE



RED ONE

WHITE THREE

BLUE FIVE

YELLOW SEVEN

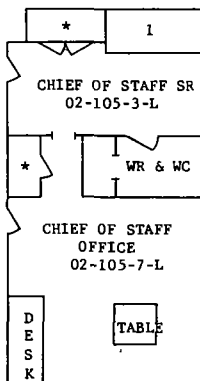
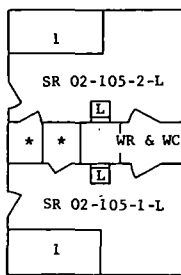
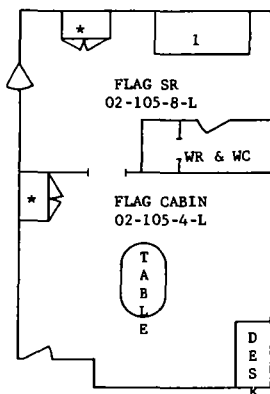
GREEN NINE

BLACK ELEVEN

*Denotes nested boat

STAFF OFFICER BERTHING
(02 LEVEL)

USS PAUL REVERE (APA 248)



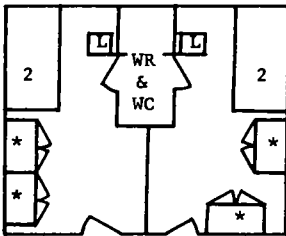
<u>SPACE</u>	<u>NUMBER OF BERTHS</u>
02-105-8-L	1
02-105-2-L	1
02-105-1-L	1
02-105-3-L	1
TOTAL	4

Notes of explanation: * Wardrobe
L Lavatory

TROOP STAFF OFFICER BERTHING
(01 LEVEL)

FWD

TROOP OFFICER BERTHING
(MAIN DECK)

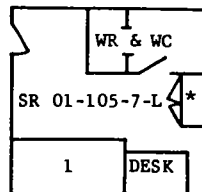
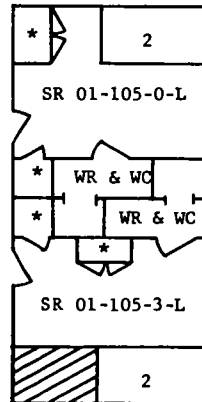
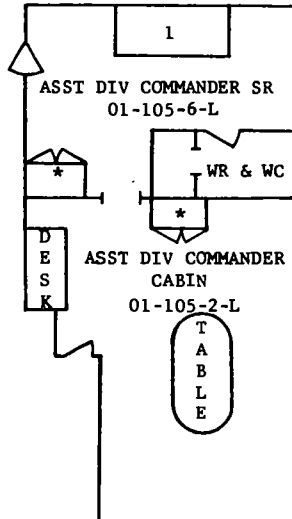


SR 1-149-2-L SR 1-146-2-L

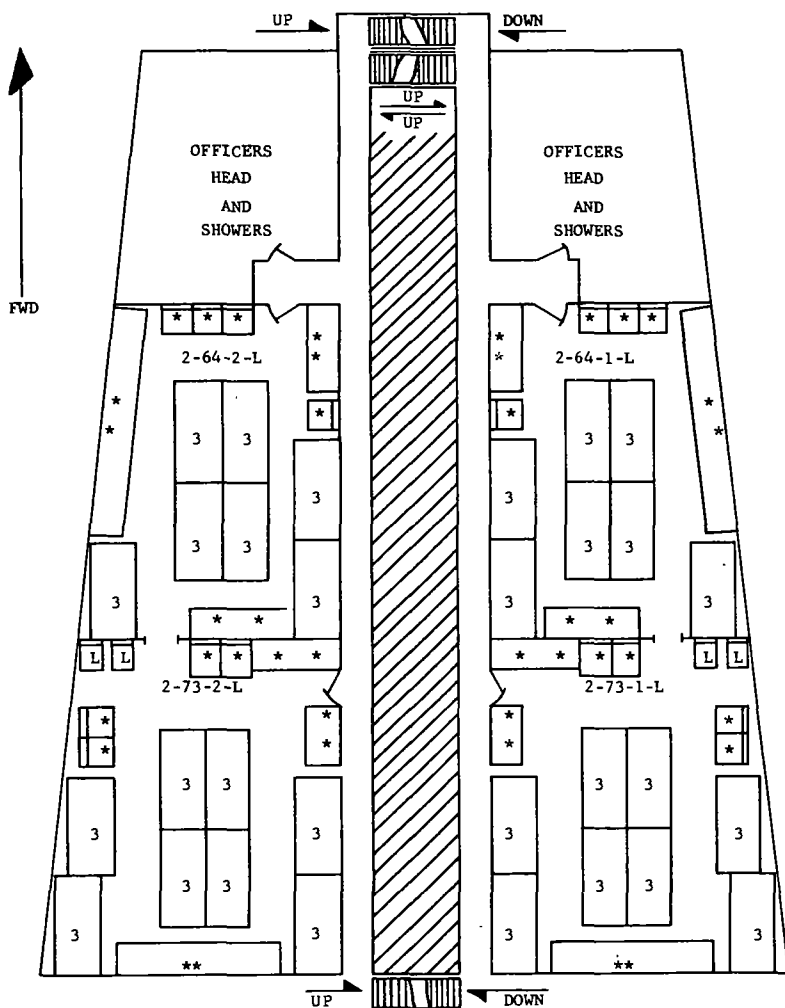
<u>SPACES</u>	<u>NUMBER OF BERTHS</u>
01-105-6-L	1
01-105-0-L	2
01-105-3-L	2
01-105-7-L	1
1-146-2-L	2
1-149-2-L	2

TOTAL 10

Notes of explanation: * Wardrobe
L Lavatory



TROOP OFFICER BERTHING



SECOND DECK

TROOP OFFICERS' LIVING SPACES

SPACE	NUMBER OF BUNKS
2-64-1-L	21
2-73-1-L	24
2-64-2-L	21
2-73-2-L	24
TOTAL	90

Notes of explanation: * Desk
 ** Clothes Stowage Racks
 L Lavatory

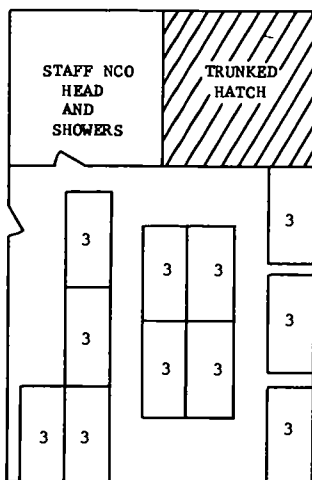
STAFF NCO BERTHING

USS PAUL REVERE (APA 248)

SECOND DECK

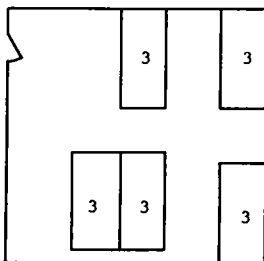
SPACE

2-95-0-L



SPACE

2-144-2-L

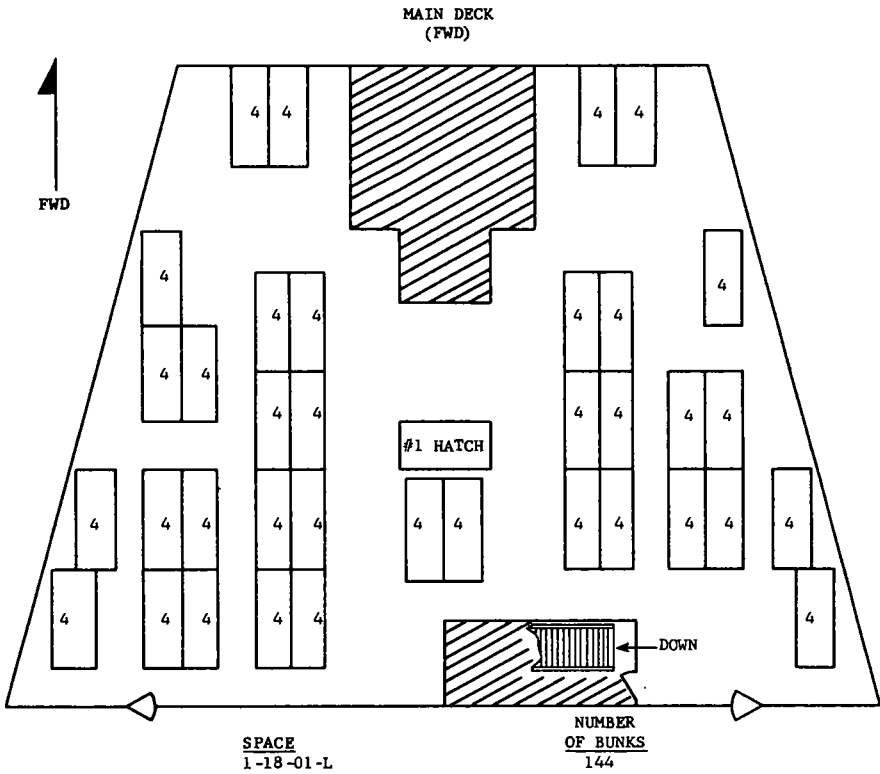


<u>SPACE</u>	<u>NUMBER OF BUNKS</u>
2-95-0-L	33
2-144-2-L	15
TOTAL	48

Notes of explanation: The nearest head facility for 2-144-2-L is aft in troop compartment 2-172-4-L.

Each bunk has stowage for one rifle and one sea bag.

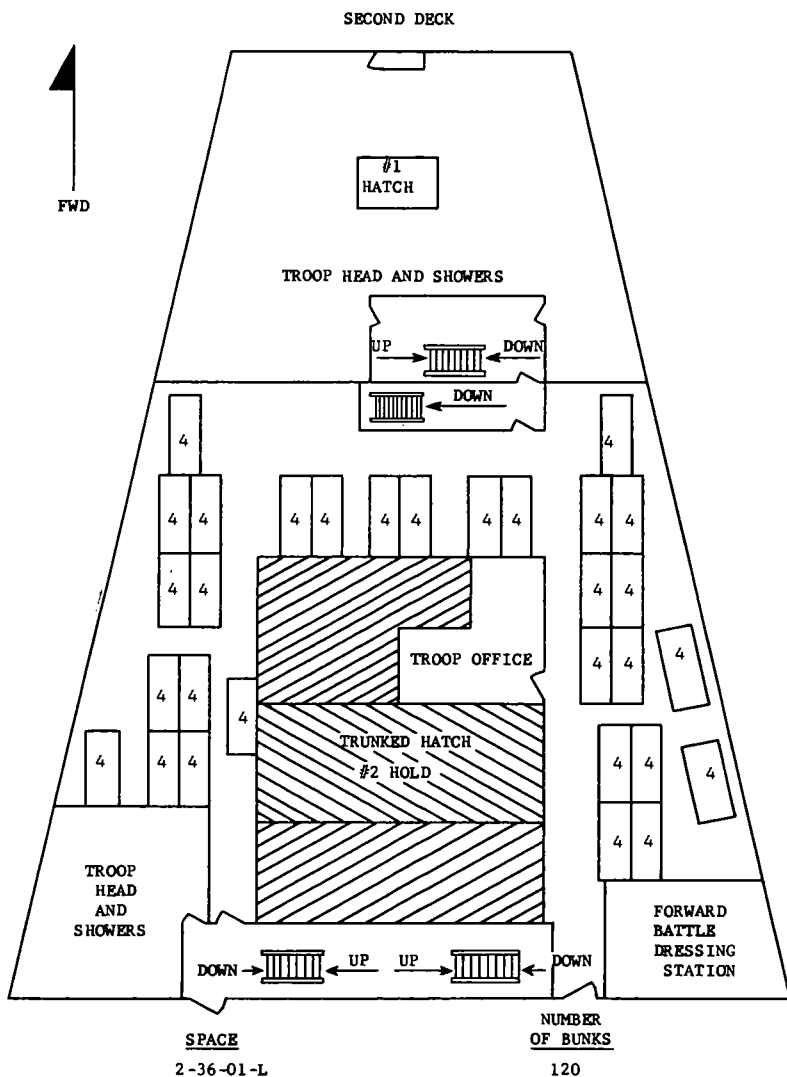
TROOP ENLISTED BERTHING



Note: Each bunk has stowage for
one rifle and one seabag.

TROOP BERTHING

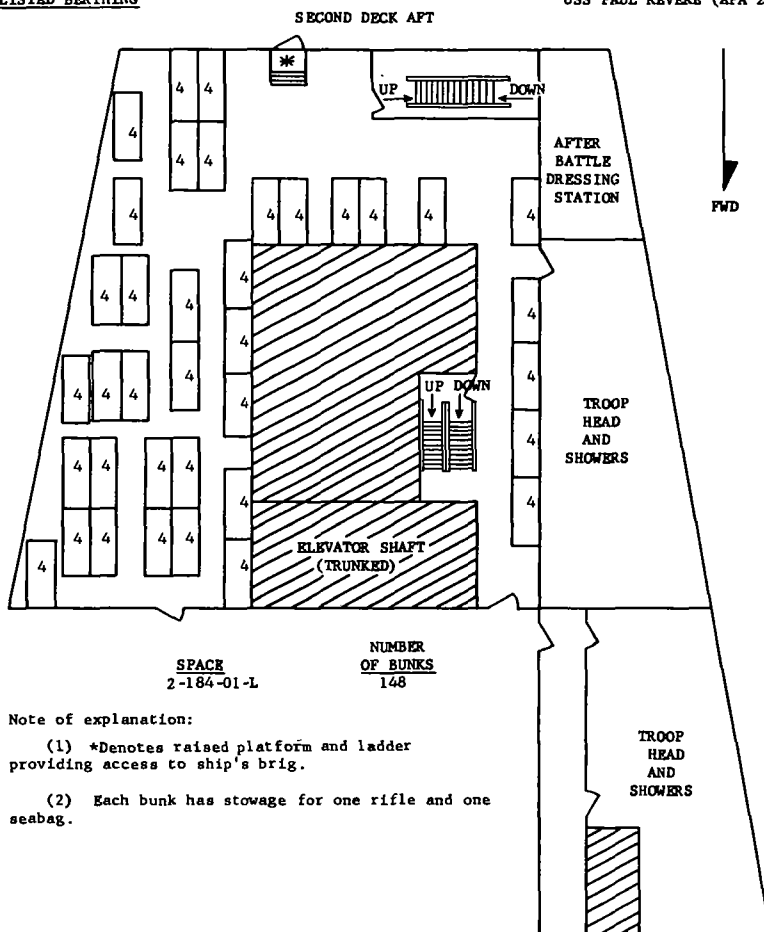
USS PAUL REVERE (APA 248)



Note of explanation: Each bunk has stowage for one rifle and one seabag.

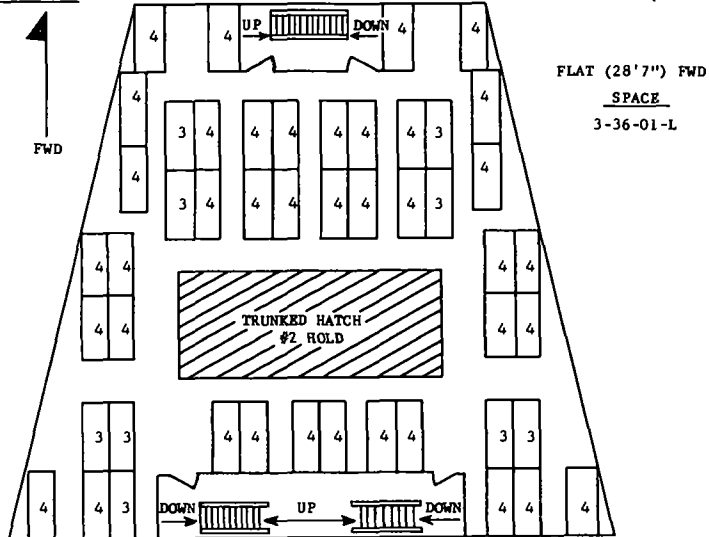
TROOP ENLISTED BERTHING

USS PAUL REVERE (APA 248)



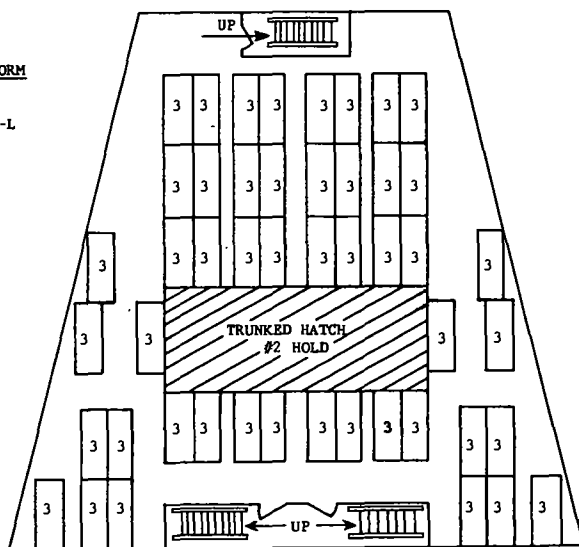
TROOP ENLISTED BERTHING

USS PAUL REVERE (APA 248)



FIRST PLATFORM

SPACE
4-36-01-L



SPACE	NUMBER OF BUNKS
3-36-01-L	183
4-36-01-L	144

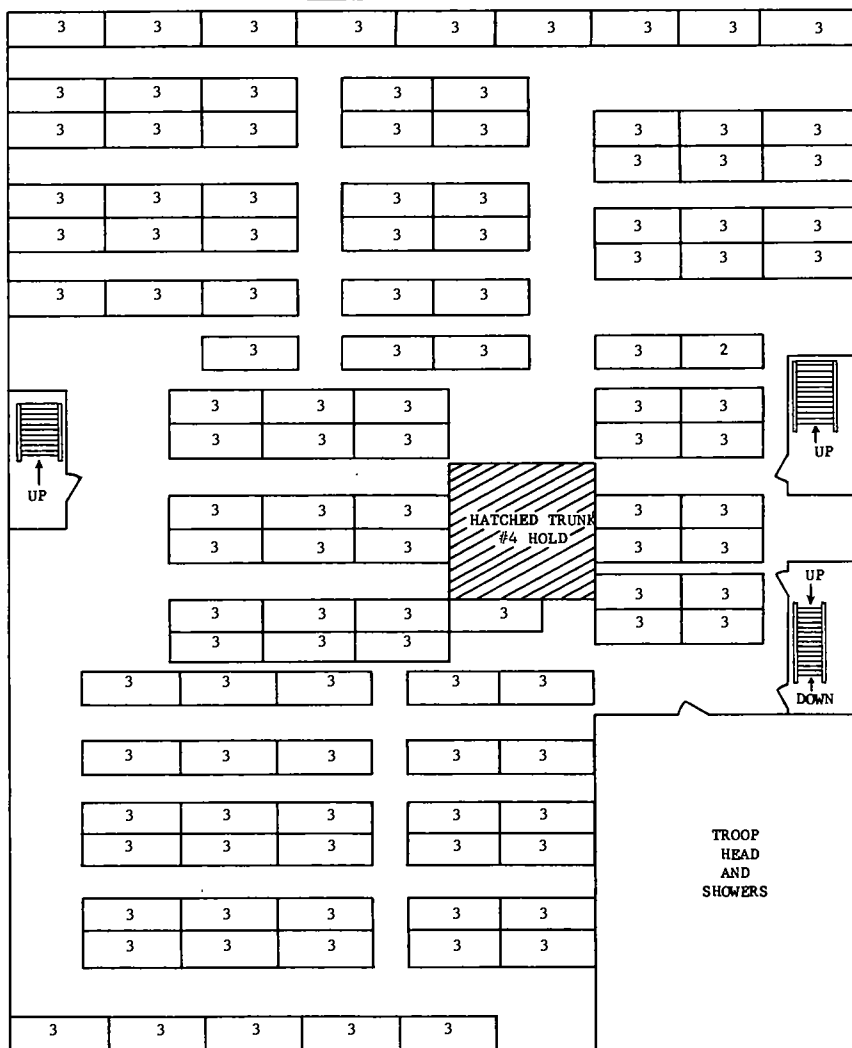
Note: Each bunk has stowage for one rifle and one seabag.

TROOP ENLISTED BERTHING

FIRST PLATFORM AMIDSHIPS

USS PAUL REVERE (APA 248)

FWD →



SPACE

4-82-0-L

NUMBER
OF BUNKS

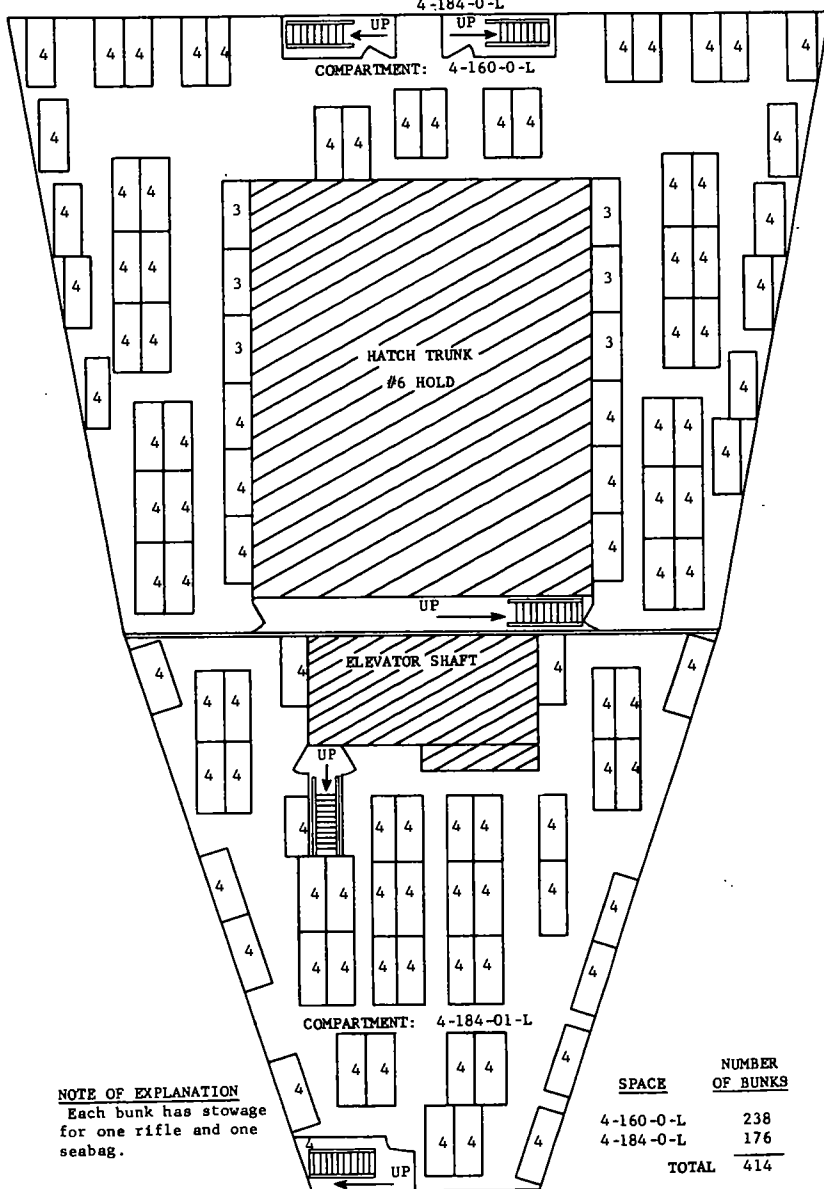
351

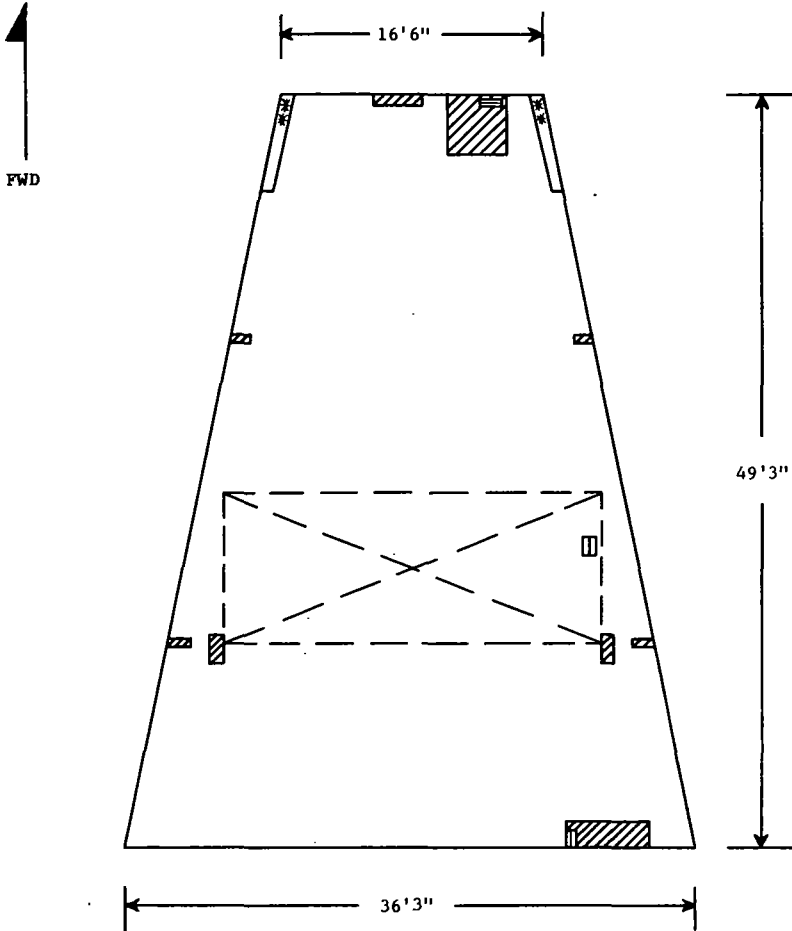
Note: Each bunk has stowage for one rifle and one seabag.

TROOP ENLISTED PERTHING

FIRST PLATFORM APT
SPACE: 4-160-0-L
4-184-0-L

USS PAUL REVERE (APA 248)

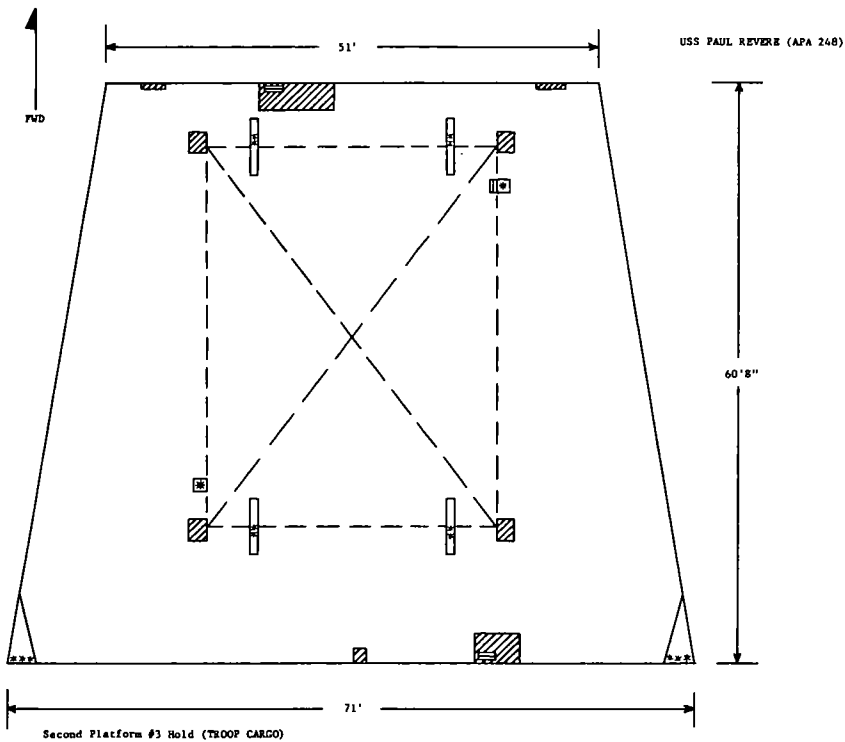




LOWER HOLD #2 HOLD (TROOP CARGO)

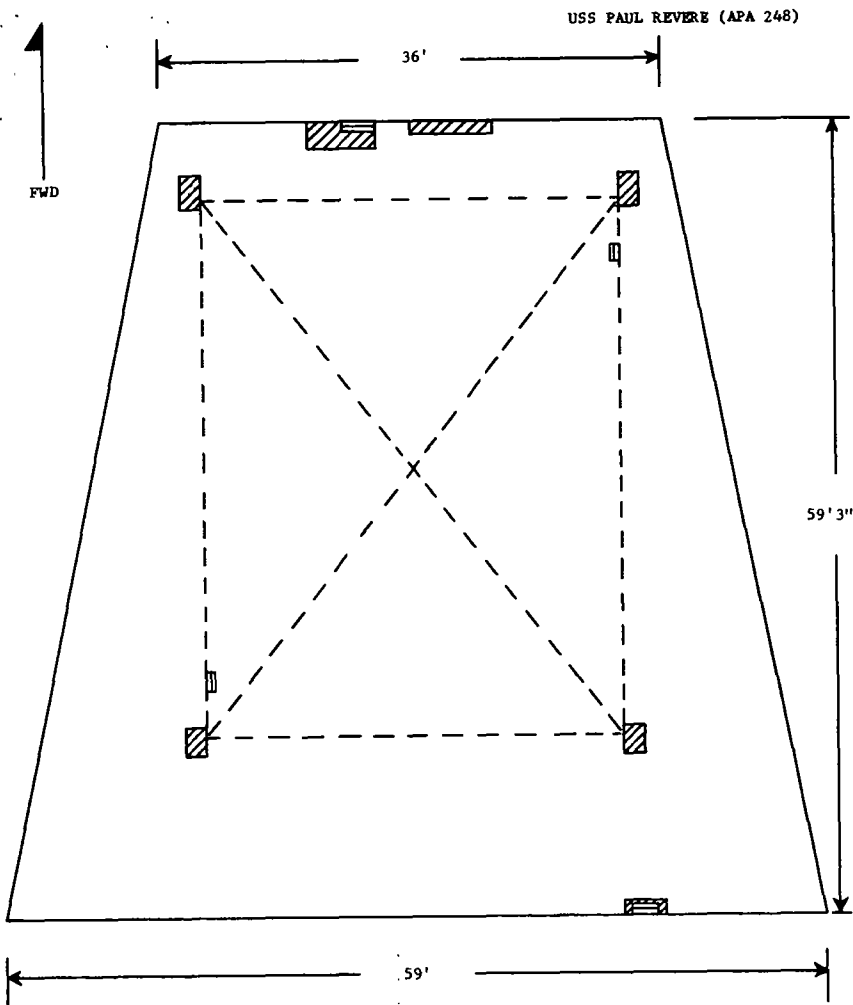
Hatch opening overhead	24' x 10'
Bale cubic capacity	15,633 Cu. Ft.
Square feet	1,256 Sq. Ft.
Clearance to coaming	12'4"
Clearance to girders	13'6"
Minimum clearance	12'4"
Booms (number and capacity)	2 8-ton
Scale: 1/8" equals 1'.	

Note of explanation: **Steel platform brace 18" off deck.



Hatch opening overhead 40' x 30'
 Bale cubic capacity 43,024 Cu. Ft.
 Square feet 3,620 Sq. Ft.
 Clearance to coaming 13'0"
 Clearance to girders 15'0"
 Minimum clearance 11'6"
 Booms (number and capacity) 1 60-ton, 1 10-ton
 Scale 1/8" equals 1'

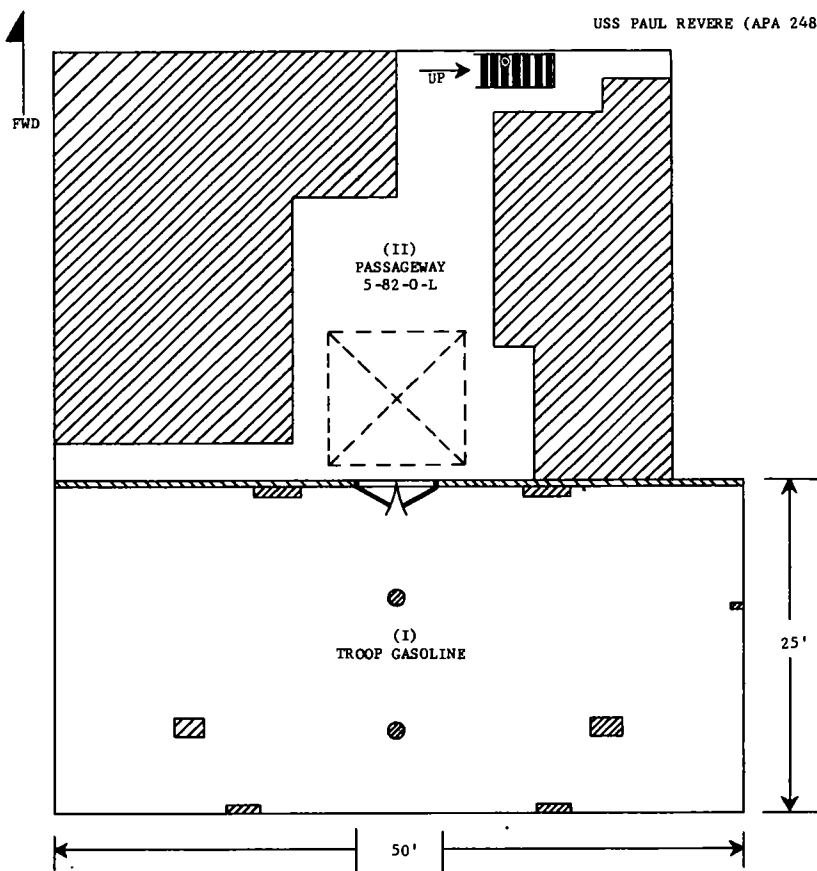
Notes of explanation.
 * Vertical ladder swivel assembly 1' off deck.
 ** Hatch bings 9" off deck.
 *** Steel platform brace 7'2" off deck.



LOWER HOLD #3 HOLD (TROOP CARGO)

Hatch opening overhead	40' x 30'
Bale cubic capacity	33,420 Cu. Ft.
Square feet	2,780 Sq. Ft.
Clearance to coaming	12'0"
Clearance to girders	13'6"
Minimum clearance	12'0"
Booms (number and capacity)	1 60-ton, 1 10-ton

Scale: 1/8" equals 1'



SECOND PLATFORM #4 HOLD

I TROOP GASOLINE

II PASSAGEWAY

Hatch opening overhead	Note #1	10' x 10'
Bale cubic capacity	7,404 Cu. Ft.	3,664 Cu. Ft.
Square Feet	1,200 Sq. Ft.	511 Sq. Ft.
Clearance to coaming	None	7'2"
Clearance to girders	7'6"	8'0"
Minimum clearance	6'2"	7'2"
Booms (number and capacity):	1 30-ton; 1 10-ton	Same
Scale: 1/8" equals 1'		

Notes of explanation:

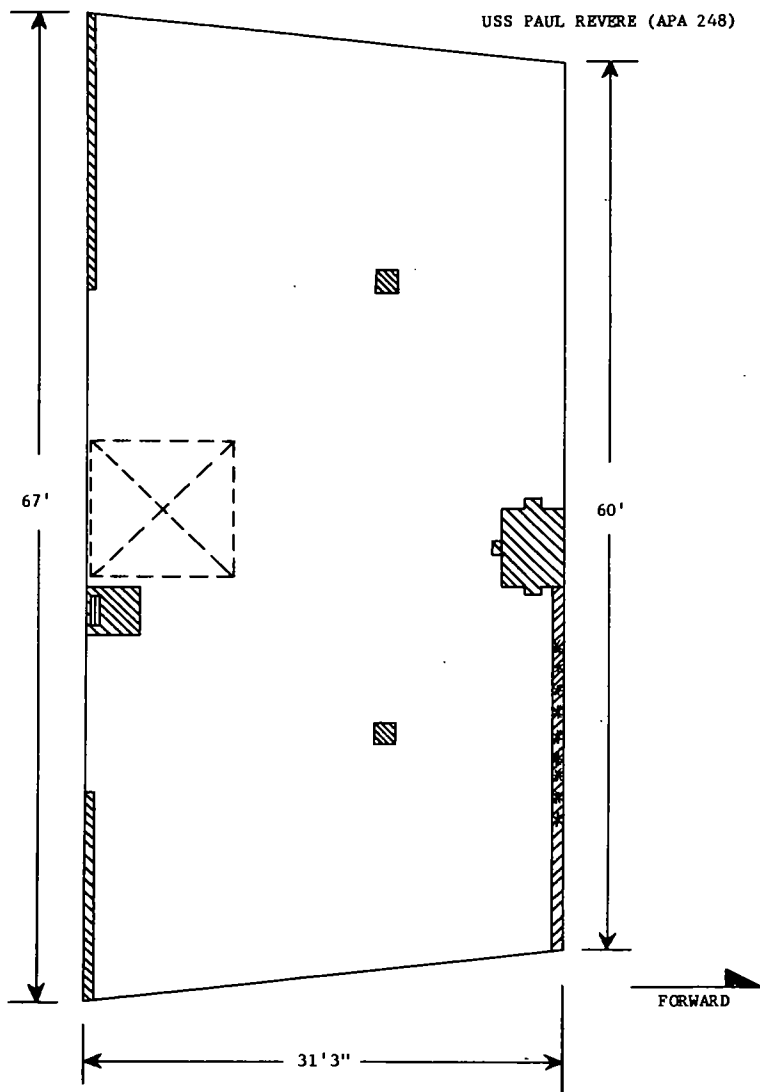
(1) Trunked hatch shown in (II) is used when the troop gas compartment is being worked. Access to this compartment consists of two watertight doors which form an opening 6' x 6' adjacent to the square of the hatch.

(2) Fifty-five gallon drum capacity of the troop gas compartment is 572 drums.

(3) The available space shown in (II) is reserved for the emergency stowage of high-priority troop cargo. Only inert cargo such as water pallets or slow-burning material should be stowed in this area to act as a fire check between stowed troop gas in the adjacent compartment and troop ammo stowed directly below in Lower Hold #4.

This space will be used for cargo stowage only in emergencies and in the event no other suitable stowage spaces are available. Use of this area for cargo stowage must in all cases be authorized by the ship's commanding officer.

(4) Due to the restrictions placed on the area shown in (II), the cubic footage and square footage of this space are not included in the ship's grand totals for cargo stowage.



LOWER HOLD #4 (TROOP AMMO)

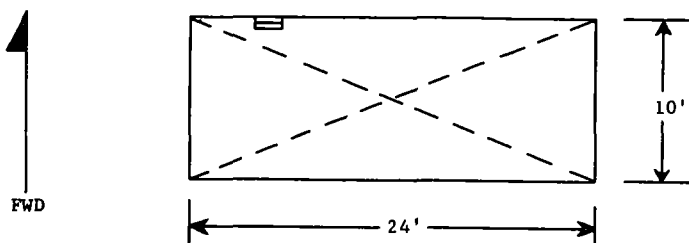
Hatch opening overhead 9'3" x 9'3"
 Bale cubic capacity 10,935 Cu. Ft.
 Square feet 1,930 Sq. Ft.
 Clearance to coaming 6'2"
 Clearance to girders 6'6"
 Minimum clearance 5'8"
 Booms (number and capacity) 1 30-ton, 1 10-ton

Scale: 1/8" equals 1'

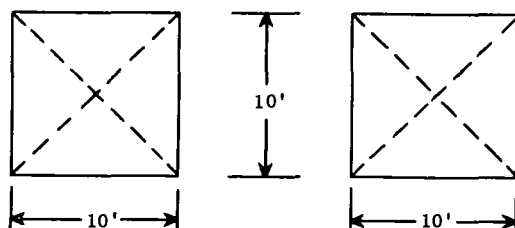
Note of explanation:  Protective cage for pipes 1'4" off deck.

SECOND PLATFORM #5 HOLD

(TROOP CARGO, EMERGENCY STOWAGE)

LOWER HOLD #5 HOLD

(TROOP CARGO, EMERGENCY STOWAGE)



	<u>SECOND PLATFORM</u>	<u>LOWER HOLD</u> <u>I and II</u>
Hatch opening overhead	24' x 10'	10' x 10'
Bale cubic capacity	2270 Cu. Ft.	950 Cu. Ft.
Square feet	9'6"	8'0"
Clearance to hatch cover	40'6"	9'6"
Minimum clearance	9'6"	9'6"
Booms (number and capacity)	2 5-ton	2 5-ton
Scale: 1/8" equals 1'		

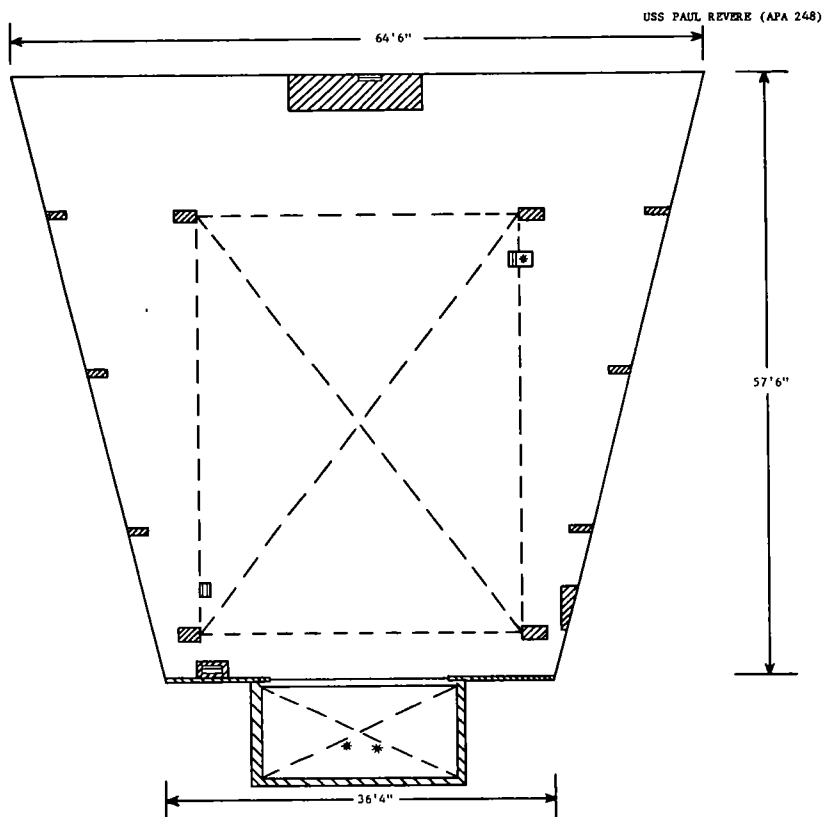
Notes of explanation:

(1) Troop cargo stowage space available in #5 hold is limited to the square of the hatches shown above.

(2) #5 hold is used for stowage of ship's provisions but may be used for stowage of high-priority troop cargo in emergencies. Use of this hold for stowage of troop cargo must in all cases be authorized by the ship's commanding officer.

(3) When authorized for troop stowage, it is recommended that this hold be used for stowage of palletized cargo or cartoned D-1 supplies.

(4) Because of the restrictions placed on this hold for troop use, the cubic footage and square footage are not included in the ship's grand totals for troop cargo stowage.

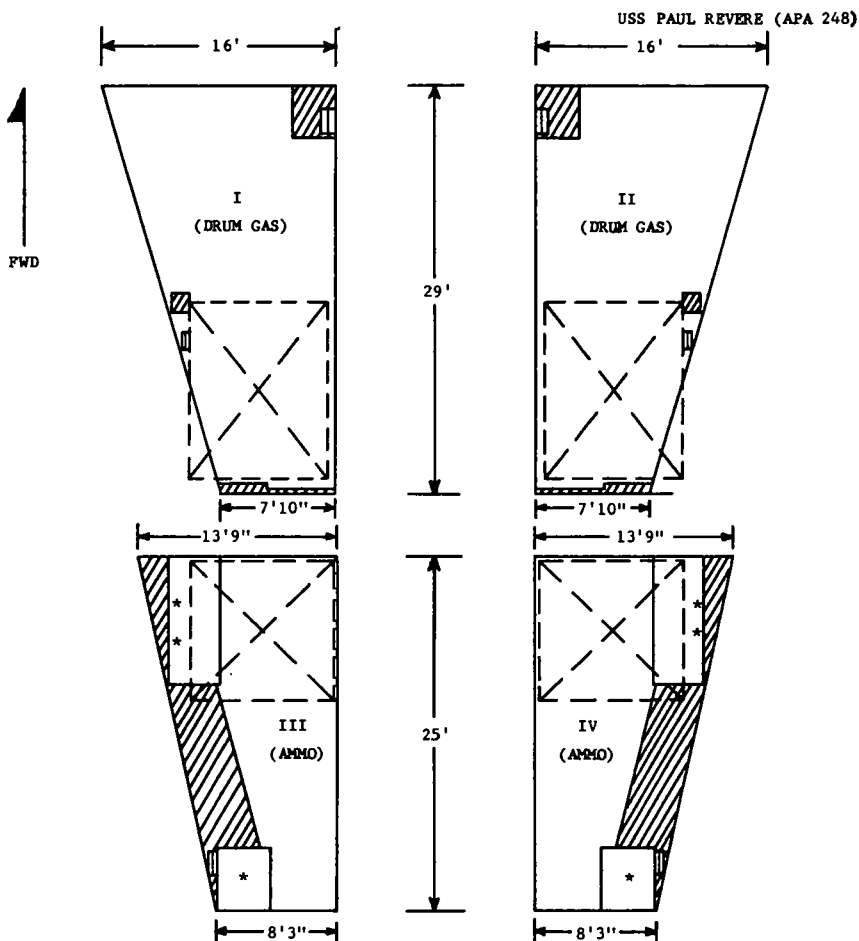


SECOND PLATFORM #6 HOLD (TROOP CARGO)

Hatch opening overhead	40' x 30'
Gross cubic capacity	19,868 Cu. Ft.
Square feet	2,831 Sq. Ft.
Clearance to coaming	6'11"
Clearance to girders	8'11"
Minimum clearance	6'11"
Booms (number and capacity)	1 60-ton, 1 10-ton
Scale: 1/8" equals 1'	

Notes of explanation:

- * Vertical ladder swivel assembly 12" off deck.
- ** Ship's elevator platform at lowest level of descent;
hatch opening for elevator on helicopter deck.



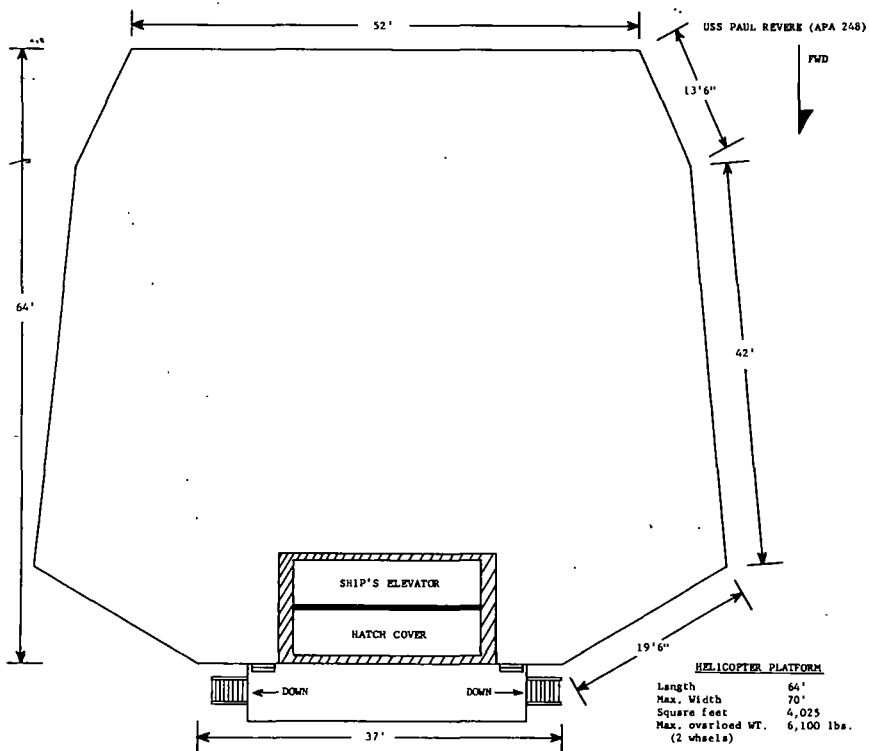
(I and II; Troop Gas)
(III and IV; Troop Ammo)

	I and II	III and IV
Hatch opening overhead	12'6" x 9'6"	10' x 10'
Bale cubic capacity	2,696 Cu. Ft.	1,649 Cu. Ft.
Square feet	330 Sq. Ft.	219 Sq. Ft.
Clearance to coaming	8'6"	8'6"
Clearance to girders	9'6"	9'6"
Minimum clearance	8'2"	8'2"
Booms (number and capacity)	1 60-ton; 1 10-ton	1 60-ton; 1 10-ton
Scale:	1/8" equals 1'	

Notes of explanation:

(1) Fifty-five gallon drum capacity for each of the gas compartments is 152 drums. These compartments can be used for diesel and kerosene stowage.

(2) Chain hoists are provided in both ammunition compartments to facilitate handling of cargo. These compartments can be used for the stowage of pyrotechnics.



Notes of explanation

- (1) The ship presently has no helicopter refueling capability but is due to have this capability in the near future.
- (2) Overall dimensions of the elevator are 19' x 10'. The elevator stops at the following levels: helicopter platform, main deck, second platform #6 hold.
- (3) Refer to paragraph 7g for further information.

APPENDIX IV PLANNING DATA

Table I. Class I Planning Data, Characteristics of Standard Rations

Type of Rations	Packaging information			Average weight per ration including packing (lb)	Remarks
	Number rations per package (case)	Weight per package (lb) (case)	Volume per package (cu ft) (case)		
Field A	-----	-----	-----	6.0	This is the basic field ration. It includes fresh and frozen meats, vegetables, and fruit. Issued when normal cooking and refrigeration facilities are available. This is the preferred ration issued when available and circumstances permit (0.183 cu ft per ration).
Operational B	-----	-----	-----	6.0	Same as field ration, with nonperishables substituted for perishables (0.1269 cu ft per ration).
Small detachment 5-1.	5 rations	28.5	1.1	5.8	Consists of nonperishable precooked food which is designed to be eaten hot. Five separate menus.
Combat, individual, type C.	6 rations	38	1.2	6.5	Nonperishable precooked food to be eaten hot or cold. It is carried and prepared by individual soldier. Six separate menus.

174	Ration, individual, combat, meal type.	4 packets (12 meals).	24	.85	1.6	Designed for use as individual meal packets or in multiples of 3 for a complete ration. Note to be used over extended periods.
	Trail, frigid, individual.	8 rations	34	1.6	4.0	Designed for use in extremely cold climates by small patrols or trail teams under conditions where resupply is impossible.
	Ration supplement, spice pack.	-----	20	0.8	-----	Provides spices, condiments, and leavening agents to supplement 1,000 field rations A or operational rations B.
	Ration supplement, sundries pack (1 pack per 100 men).	-----	47	1.9	-----	Provides comfort items such as toilet articles, tobacco, and candy, serving as a supplement to operational ration B.
	Ration supplement, aid station (makes 205 8-ounce drinks).	-----	20	1.1	-----	Designed to provide special nourishment in the form of hot stimulating beverages for combat zone casualties at aid and clearing stations.

Table II. Class III Planning Data, Fuel and Lubricants

Nomenclature	Standard package		
	Units	Cu. ft.	Wt. (lbs)
GASOLINE:			
55-gallon drum -----	53 gal	9.2	376.0
5-gallon expeditionary can -----	5 gal	0.81	41.6
1-gallon (bulk) -----	1 gal	0.134	6.1
DIESEL:			
55-gallon drum -----	53 gal	9.2	421.0
5-gallon expeditionary can -----	5 gal	0.81	45.0
1-gallon (bulk) -----	1 gal	0.134	6.6
KEROSENE:			
55-gallon drum -----	53 gal	9.2	351.0
5-gallon expeditionary can -----	5 gal	0.81	45.0
1-gallon (bulk) -----	1 gal	0.134	6.6
OIL—LUBRICATION:			
55-gallon drum -----	53 gal	9.2	462.0
5-gallon can -----	5 gal	0.81	49.0
1-gallon (bulk) -----	1 gal	0.134	7.5
1-case of pint cans, crated -----	12 qt	.88	35.0
COMPOUND:			
Antifreeze -----	1 gal	0.233	10.0
Sealing gasket, automotive -----	1 pt	0.046	1.25
Antifreeze, mica base -----	1 lb	0.046	1.25
Rust preventive, thin film, polar type ---	1 gal	0.3	10.0
FLUID:			
Hydraulic brake -----	1 gal	0.233	10.0
Shock absorber -----	1 gal	0.233	10.0
GRAPHITE:			
Amorphous -----	1 lb	0.046	1.25
GREASE:			
25-pound pail -----	25 lb	0.95	29.0
5-pound cans, 6 per case, crated -----	30 lb	1.1	44.0

Table III. Class V Planning Data

Nomenclature	Number per unit	Weight (lb)		Cubic feet		Stowage factor	
		Crated	Uncrated	Crated	Uncrated	Crated	Uncrated
Canister, N2, 37-mm, G-----	20	102	----	2.04	----	45	----
Cart, AP, cal .30, in cartons-----	1,500	102	----	1.5	----	30	----
Cart, AP, cal .30, 8-rd clip-----	1,440	112	----	1.5	----	30	----
Cart, AP, cal .50, in cartons-----	300	97	----	1.5	----	35	----
Cart, AP, cal .50, in cartons-----	350	112	----	1.5	----	30	----
Cart, AP, 7.62-mm, in cartons, grade R-----	960	72	----	.91	----	28	----
Cart, AP, 7.62-mm, in cartons, grade R-----	1,040	78	----	1.28	----	37	----
Cart, AP, 7.62-mm, in cartons, grade R-----	1,200	86	----	1.28	----	33	----
Cart, AP, 7.62-mm, in cartons, grade MG-----	1,200	86	----	1.28	----	33	----
Cart, AP, I&T, cal .30, l/b-----	1,200	101	----	1.5	----	33	----
Cart, AP, I&T, cal .50, l/b-----	265	103	----	1.5	----	33	----
Cart, AP&T, cal .30, w/b (100 rds)-----	1,200	92	----	1.5	----	37	----
Cart, AP&T, cal .30, w/b-----	1,240	98	----	1.5	----	34	----
Cart, AP&T, cal .30, w/b-----	1,250	100	----	1.5	----	34	----
Cart, AP&T, cal .30, l/b-----	1,200	107	----	1.5	----	31	----
Cart, AP&T, w/b, 250-rd MG, chest-----	1,000	77	----	.9	----	26	----
Cart, API, 7.62-mm, in cartons, grade R-----	1,200	86	----	1.28	----	33	----
Cart, B&T, cal .30, w/b, 250-rd MG, chest-----	1,000	77	----	.9	----	26	----
Cart, B&T, cal .30, web belt-----	1,250	96	----	1.5	----	35	----
Cart, B&T, cal .30, w/b-----	1,200	93	----	1.5	----	36	----
Cart, B&T, 7.62-mm, 100-rd belt-----	800	----	----	.91	----	----	----
Cart, B&T, 7.62-mm, 210-rd belt-----	840	----	----	.91	----	----	----
Cart, B&T, 7.62-mm, 220-rd belt-----	880	----	----	.92	----	----	----
Cart, ball, cal .30, carbine-----	3,000	100	----	.85	----	19	----

Cart, ball, cal .30, carbine-----	3,450	107	----	.9	----	19	----
Cart, ball, cal .30, 8-rd clip-----	1,344	110	----	1.5	----	31	----
Cart, ball, cal .30, 5-rd clip-----	1,440	117	----	1.5	----	29	----
Cart, ball, cal .30, 5-rd clip-----	1,500	114	----	1.5	----	29	----
Cart, ball, cal .30, in cartons-----	1,500	111	----	1.5	----	30	----
Cart, ball, cal .45, in cartons-----	1,800	97	----	.8	----	19	----
Cart, ball, cal .45, in cartons-----	2,000	111	----	1.0	----	20	----
Cart, ball, cal .50, in cartons-----	350	107	----	1.5	----	31	----
Cart, ball, 7.62-mm, linked, grade MG-----	880	78	----	.92	----	26	----
Cart, ball, 7.62-mm, in cartons, grade R-----	960	72	----	.91	----	28	----
Cart, ball, 7.62-mm, in cartons, grade R-----	1,200	86	----	1.28	----	33	----
Cart, grenade, cal .30, M3-----	2,000	90	----	1.5	----	37	----
Cart, inc, cal .50, in cartons-----	350	108	----	1.5	----	31	----
Cart, tracer, cal .30, in cartons-----	1,500	108	----	1.5	----	31	----
Cart, tracer, cal .30, 5-rd clip-----	1,500	114	----	1.5	----	29	----
Cart, tracer, cal .30, 8-rd clip-----	1,440	117	----	1.5	----	29	----
Cart, tracer, cal .50, in cartons-----	350	111	----	1.5	----	30	----
Cart, tracer, 7.62-mm, in cartons, grade R-----	1,200	86	----	1.28	----	33	----
Cart, tracer, 7.62-mm, M62 in cartons, grade R-----	400	28	----	.54	----	43	----
Cart, tracer, 7.62-mm, M62 in cartons, grade R-----	960	72	----	.91	----	28	----
Cart, tracer, 7.62-mm, M62 in cartons, grade R-----	1,040	78	----	1.28	----	37	----
Cart, 12 ga, No. 00 buckshot-----	500	62	----	.768	----	28	----
Cart, 12 ga, No. 7½-----	500	58	----	.768	----	30	----
Chg, prop, M1A1 (green bag) 155H-----	6	67	40	3.08	1.91	103	107
Chg, prop, M3 (green bag) 155H-----	6	82	53	3.33	2.68	91	114
Chg, prop, M2 (white bag) 155H-----	6	82	73	3.26	2.63	89	81
Chg, prop, M4 (white bag) 155H-----	3	79	58	3.92	2.5	111	97
Chg, prop, 155G, 1917-17A1-18M1-----	1	87	----	3.0	----	77	----
Chg, prop, 155G, M1917-17A1-18M1-----	3	131	105	4.96	4.19	85	89
Chg, prop, 155G, M1917-17A1-18M1-----	4	191	----	7.08	----	83	----

Table III. Class V Planning Data—Continued

Nomenclature	Number per unit	Weight (lb)		Cubic feet		Stowage factor	
		Uncrated	Crated	Crated	Uncrated	Crated	Uncrated
Chg, prop, 155G, M1 and M1A1-----	3	161	127	7.44	5.15	104	91
Fuze, PD, M46-----	50	51	----	.89	----	39	----
Fuze, PD, M47-----	50	53	----	.89	----	38	----
Fuze, PD, M51, M51A1, M55, M55A1-----	25	83	----	1.46	----	39	----
Fuze, PD, M. T., M67-----	25	78	----	1.46	----	42	----
Fuze, det, M6A2-----	200	64	----	2.50	----	88	----
Fuze, ing, M10A2-----	200	64	----	2.7	----	95	----
Grenade, AT, M11A1, prct-----	50	87	----	3.3	----	85	----
Grenade, hand, frg, Mk II-----	25	50	----	1.26	----	57	----
Grenade, hand, off (unfuzed)-----	50	50	----	1.37	----	62	----
Grenade, hand, tug, Mk I A1-----	24	47	----	.97	----	46	----
Grenade, rifle, M9 and M9A1-----	10	32	----	1.2	----	83	----
Grenade, rifle, prct, M11-----	50	108	----	2.8	----	58	----
Mine, AP, M2, M2A1-----	10	93.4	----	2.33	----	56	----
Mine, AP, M3-----	6	75	----	.80	----	24	----
Mine, AT, M1, prct-----	5	68	----	1.45	----	48	----
Mine, AT, M1A1-----	5	73	----	1.45	----	45	----
Primer, DTE, M14, 1-sec delay-----	100	67	----	1.01	----	34	----
Primer, perc, Mk 11, Mk 11A, Mk 11A1-----	2,400	96	----	1.56	----	36	----
Shell, AP, M112B1, 155G-----	1	117	----	1.34	----	26	----
Shell, all other, 155-mm-----	1	----	96	----	.83	----	19
Shell, HE, M1, w/f M48, 105-mm H-----	3	172	154	2.37	2.06	31	30
Shell, HE, M43A1, (lt) 81-mm, M-----	6	72	58	1.65	1.08	51	42
Shell, HE, M48, w/f M48, 75 GNC-----	3	82	68	1.84	1.03	50	34

Shell, HE, M48, w/f M48, 75 GNC-----	3	84	70	1.84	1.03	50	33
Shell, HE, M48, w/f M48, 75H-----	3	80	69	1.35	.92	38	30
Shell, HE, M48, w/f M54, 75 GNC-----	3	82	68	1.84	1.03	50	34
Shell, HE, M48, w/f M54, 75 GNC-----	3	84	70	1.84	1.03	50	33
Shell, HE, M48, w/f M54, 75H-----	3	80	69	1.35	.92	38	30
Shell, HE, M49A2, 60-mm, M-----	18	103	82	3.23	2.51	70	69
Shell, HE, M56 (hv), 81-mm, M-----	3	55	42	1.33	.91	54	49
Shell, HE, M63, 37-mm, G-----	20	91	----	2.04	----	50	----
Shell, HE, M71, 90-mm, G-----	4	237	----	4.43	----	42	----
Shell, HE, N54, 37-mm, G-----	25	99	----	2.03	----	46	----
Shell, HE, Mk 1 (Navy), 40-mm, G-----	16	115	----	1.80	----	35	----
Shell, HE, Mk 11, 37-mm, G-----	60	114	----	1.60	----	31	----
Shell, HE, w/f, M54, 105 H-----	3	172	154	2.37	2.06	31	30
Shell, HE, 3" AA G-----	4	153	----	3.22	----	47	----
Shell, QF, Mk II, 40-mm, G-----	24	161	----	3.13	----	44	----
Shell, prct, Mk II, 37-mm, G-----	40	90	----	1.38	----	34	----
Shell, prct, M50A2, 60-mm, M-----	18	103	82	2.23	2.51	70	69
Shell, Mk I, unfuzed, 75 G-----	3	72	57	1.72	.96	54	38
Shell, 8", G-----	1	----	386	----	----	----	----
Shell, 8", how-----	1	----	253	----	----	----	----
Shell, 280-mm, G-----	1	----	660	----	----	----	----
Shot, AP, M78, 3", AA G-----	4	153	----	3.22	----	47	----
Shot, AP, M51, 37-mm, G-----	20	104	----	2.01	----	43	----
Shot, AP, M74, 37-mm, G-----	20	91	----	1.01	----	50	----
Shot, AP, M72, 75 G-----	3	80	66	1.51	.83	28	28
Shot, AP, M77, 90-mm, G-----	4	237	----	4.43	----	42	----
Shot, APC, M59, 37-mm, G-----	25	99	----	2.03	----	46	----
Shot, APC, M61, 75-mm, G.S.C-----	3	83	70	1.84	1.03	50	33
Shot, LE, Mk I, 37-mm, G-----	60	105	----	1.38	----	29	----
Signal, ground, M17 to M22-----	61	----	----	1.85	----	----	----

Table III. Class V Planning Data—Continued

Nomenclature	Number per unit	Weight (lb)		Cubic feet		Stowage factor	
		Uncrated	Crated	Crated	Uncrated	Crated	Uncrated
Signal, Very, red and white, Mk II-----	31	----	----	.92	----	----	----
Signal, Very, red and green star, Mk II-----	103	----	----	2.57	----	----	----
Smoke, WP, M60, 105 H-----	3	172	159	2.37	2.06	31	29
Smoke, WP, M64, 75 H-----	3	82	70	1.66	.92	45	29
Smoke, WP, M57, 81-mm, M-----	3	55	45	1.65	.91	67	45
Smoke, WP, Mk II, unfuzed, 75 G-----	3	72	57	1.72	.96	54	38

APPENDIX V

AMPHIBIOUS AND MERCHANT SHIPPING CHARACTERISTICS

Table I. Characteristics of Amphibious Ships

Name	Number of ships in class	Class	Type	Length	Loaded draft	Troop capacity	Cargo capacity (long tons)	Cargo space	Boat capacity	Cruising range (nautical miles)
Amphibious force flagship (AGC).	8	-----	C-2	459'	24'	-----	-----	-----	2 LCVP 4 LCP(L) 2 LCP(R)	30,000
Attack transport (APA 117) ..	22	Haskell	-----	455'	24'	1,565	446	13,000 sq ft 110,000 cu ft	2 LCM(6) 22 LCVP 1 LCP(L) 1 LCP(R)	9,800
Attack transport (APA 33) ---	6	Bayfield	-----	492'	27'	1,647	446	15,000 sq ft 160,000 cu ft	4 LCM(6) 18 LCVP 3 LCP(L) 2 LCP(R)	11,630
Attack cargo ship (AKA) -----	35	-----	C-2A	459'	24'	212	1,335- 1,600	31,858 sq ft 291,706 cu ft	6 LCM(6) 14 LCVP 1 LCP(L) 1 LCP(R) 2 LCM(3)	12,000

Table I. Characteristics of Amphibious Ships—Continued

Name	Number of ships in class	Class	Type	Length	Loaded draft	Troop capacity	Cargo capacity (long tons)	Cargo space	Boat capacity	Cruising range (nautical miles)
High-speed transport (APD) ..	66	-----	EX-DDE	306'	13'	156	45	3,730 cu ft	2 LCVP 2 LCP(R) or 2 LCP(L)	5,100
Transport submarine (ASSP) ..	2	Sea Lion	-----	312'	-----	85	26.7	-----	20 rubber landing rafts.	

Table II. Characteristics of Landing Craft

Name	Symbol	Length	Beam	Capacity Draft (loaded)				Speed loaded (knots)	Range (miles)	Crew	Weight, empty (long tons)	Cargo space dimensions
				Troop	Cargo (long tons)	Forward	Aft					
Landing craft, vehicle and personnel....	LCVP	36' 0"	10' 5"	36 or	3.5	2' 2"	3' 0"	10.5	135	4	8	17' 3"×7' 5"×5'
Landing craft, mechanized (Mark 3)....	LCM(3)	50' 0"	14' 0"	69 or	26.7	3' 6"	4' 6"	8	400 at 7 knots.	4	23.2	31' 6"×9' 6"×6' 4"
Landing craft mechanized (Mark 6)....	LCM(6)	56' 0"	14' 0"	120 or	32	3' 0"	4' 8"	8	128 at 8 knots.	4	28	38'×9' 6"×6' 4"
Landing craft, mechanized (Mark 8)....	LCM(8)	73' 6"	21'	200 or	53.5	3' 0"	5' 0"	10	284	6	60	37' 8"×14' 5"×3' 8"
Landing craft, utility (1466 class).....	LCU	115' 1"	34'	300 or	135	3' 1"	4' 0"	7	700	12	180	52'×29' 6"×4' 6" plus 22'×14' 4"×4' 6"
Landing craft, utility (1610 class)*.....	LCU	135' 3"	29'	400 or	170 ^b	3' 3"	6' 7¼"	12	^b 450	12	174	27'×27'×4' 6" plus 53'×18'×4' 6" plus 14'×20'×4' 6" plus 11'×13'×4' 6"

* Based on contractual characteristics.

^b Estimates.

Table III. Characteristics of Landing Ships

Name	No. ships in class	Type	Operating range (nautical miles)	Cargo capacity (long tons)	Troop capacity	Cargo space (sq ft)	Loaded draft		Length	Boat capacity	Typical loads
							Beaching	Oceangoing			
LSM	136	Ramp, open well.	10,000	Landing—147 Full—446	56	2,900	3' 6" fwd 7' 1" aft	6' 4½" fwd 8' 5" aft	204'	-----	3 M48 tanks 5 LVT's 9 DUKW's
LST (542)	60	Ramp, 50-ton capacity.	7,706	Normal—446 Maximum beaching—803. Full—1,212	141	4,556 (vehicles). 9,772 (cargo).	5' 3" fwd 10' 2" aft	7' 2" fwd 13' 0" aft	328'	4 LCVP or 4 LCP(R)	26 2½-ton trks, 650 long tons cargo. 46 ¾-ton trks, 675 long tons cargo. 75 ¼-ton trks, 710 long tons cargo. 17 DUKW's, 685 long tons cargo.*
LST (1153)	2	Steam-driven, ramp, 50-ton capacity.	7,700	Normal—446 Maximum landing—803 Full—2,060	197	14,340	3' 11" fwd 11' 11" aft	9' 6" fwd 16' 3" aft	382'	4 LCVP or 4 LCP(R)	21 LVT's and 35 2½-ton trks.
LST (1156)	15	Ramp, 50-ton capacity.	6,000	Normal—446 Maximum landing—803. Full—1,395	395	14,000 (vehicles). 16,500 (cargo).	4' 11" fwd 10' 8" aft	8' 3" fwd 14' aft	382'	3 LCVP and 1 LCP(L)	80 2½-ton trks, 450 long tons cargo. 144 ¾-ton trks, 415 long tons cargo. 233 ¼-ton trks, 530 long tons cargo. 54 DUKW's 445 long tons cargo.

LST (Suffolk County).	-----	Ramp 75-ton capacity equipped w/ turntable.	6,048	Normal—500T Maximum beaching—900T. Full load—1850T (Cargo diesel) 520T. <i>Gasoline:</i> Motor—3500 gal. Avn—3500 gal.	634	18,313	4' 0" fwd 13' 0" aft	9' 9" fwd 16' 0" aft	442'	3 LCV 1 LCP(L) 1 punt 55 life raft (15 man).	19 LVT(5) or LVTH (6) and 5 H-19 helicopter or 49 DUKW or 69 trk, 2½-ton, or 42 trk, 2½-ton w/ tlr, 1½-ton or 42 tank (M48)
LSD (Ashland).	7	Flooded well deck.	13,000	1,233	226	17,316	27' (flooded).	18' (dry)	458'	2 LCV and 1 LCP(L)	3 LCU, 4-5 med trks; 18 LCM(6), 30 long tons cargo; 41 LVT; 27 LCV; 47 DUKW; 44 M47 tks
LSD (Thomaston).	8	Flooded well deck.	13,000	2,410	353	19,800	30' (flooded).	19' (dry)	510'	3 LCV and 1 LCP(L)	Same as LSD(1) or with two temporary decks w/ramps 92 LVT or 108 DUKW
LSD (cabildo) 13-22, 25-27.	13	Flooded well deck.	9,500	2,500	313	24,792	32' 6" fwd 35' aft (flooded).	19' (dry)	510' 10"	3 LCV 1 LCP(L) 1 punt 52 life raft (15 man).	3 LCU or 20 LCM(6) or 9 LCM(8) or 49 LVTP(5) or LVPH (6) or 5 BARC or with mezzanine deck installed, 95 DUKW

* Also one LCU on launching ways and two 2X30 pontoon causeways or four 3X12 pontoon barges.

† Add 6,336 square feet with mezzanine deck installed.

Table IV. Characteristics of Amphibious Vehicles

Name	Symbol	Length	Beam	Capacity		Speed: land, MPH; water, knots *	Range (miles)*	Crew	Weight, empty (long tons)	Example of material carried
				Troop	Cargo (long tons)					
Carrier, cargo.....	M29c	14' 5 $\frac{1}{8}$ "	5' 7 $\frac{1}{4}$ "	4 or	.2	32L 3.4W	175L 45.2W	2 to 4	1.7	Light cargo or personnel.
Carrier, personnel tracked.....	M59	18' 5"	10' 8 $\frac{1}{2}$ "	10 or	1.5	32L 4.3W	120L 15W	1	17.3	Personnel or light cargo.
Carrier, personnel tracked.....	M113	15' 9"	8' 9"	12	2.5L 1.8W	40L 3.5W	200L 20W	1	8.9	Personnel or light cargo.
Carrier, cargo, amphibious.....	M76	15' 7"	8' 2"	10 or	15	28L 3.4W	160L 24.6W	2	4.3	10 Passengers (including crew).
Landing vehicle, tracked (Mark IV).....	LVT(4)	25' 1 $\frac{1}{2}$ "	11' 2 $\frac{1}{2}$ "	24 or	5L 4W	15L 7W	150L 100W	2 to 7	12.3	1 medical aid station (including $\frac{1}{4}$ -ton truck).
Landing vehicle, tracked (armored) (Mark IV).....	LVT(A)(4)	25' 1 $\frac{1}{2}$ "	11' 2 $\frac{1}{2}$ "	-----	-----	15L 5.2W	150L 100W	6	15.7	None.
Landing vehicle, tracked (Mark V).....	LVTP(5)	29' 8"	11' 8 $\frac{1}{2}$ "	34	6(W) 9(L)	30L 6.7W	187L 57W	3	31.2	105-mm howitzer with crew and 100 rounds ammo.
Landing vehicle, tracked (armored) (Mark V).....	LVT(A)(5)	27' 2 $\frac{1}{2}$ "	10' 10"	-----	-----	20L 5.6W	150L 50W	5	15.7	None.
Landing vehicle, tracked (Mark VI).....	LVTH(6)	21' 8"	11' 8 $\frac{1}{2}$ "	-----	-----	27.8L 6.1W	125L 45W	5	37.8	None.

Landing vehicle, tracked (Mark VI)-----	LVTP(6)	21' 7"	10' 9"	20	4(W) 5(L)	30L 5.5W	125L 45W	3	17.9	Bulk cargo.
Mortar, self-propelled, tracked-----	M84	18' 5"	10' 4"	6	1.6	30L 3.8W	90L --W	6	23.15	Mortar, 4.2 in.
Truck, 2½-ton, 6×6, amphibious-----	DUKW	31' 0"	8' 3"	25	2.2 to 4.5	50L 5W	240L 25W	2	7.5	1 105-mm howitzer.
Lighter, amphibious, resupply, cargo, 5-ton----	LARC-5	35' 0"	10' 0"	25	4.4	25L 10W	160L 65W	2	7.2	Unitized cargo.
Lighter, amphibious, resupply, cargo, 15-ton--	LARC-15	45' 0"	12' 6"	50	13.4	20L 9.7W	75L 28W	2	15	1 loaded 2½-ton track or 10 palletized units.
Lighter, amphibious, 60-ton-----	BARC	62' 6¾"	26' 7"	125 (normal) 200 (emerg)	53.6 (normal) 89.3 (emerg)	14L 7W	210L 105W	8	87	Heavy, bulky equipment.

* L—land; W—water.

Note. No consideration need be made for the draft of amphibious vehicles. However, consideration must be given to the characteristics of the landing area which may affect beaching, such as mud, coral, or rock formations.

Table V. Merchant Ship Capacities

Vessel	Deadweight (long tons)	Measurement tons ^{1 2}	Bale cubic capacity (cu. ft.) ^{1 2}	Grain cubic capacity (cu. ft.) ¹	Refrigerated cargo (cu. ft.)	Liquid cargo (bbl)
Liberty.....	10,800	11,886	475,444	563,257		
Victory.....	10,800	11,413	456,525	528,325		
C1-B cargo.....	9,100	11,300	452,000	508,000		
C2 cargo.....	9,250	11,823	472,935	548,560		
C3 cargo.....	12,300	18,425	736,980	815,470	³ 45,000	
C4 cargo.....	14,863	17,790	672,240	727,430	⁴ 32,375	
FS freighter.....	470	483	19,320	21,462		
C1-M-AV1.....	5,032	5,699	227,930	250,000	9,830	4,000
T2-SE tanker.....	16,583	381	15,230			141,000
ZET 1 tanker ⁵	10,800					65,000
Supertanker ⁶	25,000					165,000
C4 mariner.....	12,900	18,418	736,723	837,305	30,254	

¹ On-deck space or lost space in stowage not included.

² Does not include capacity of three deep tanks of the Liberty type ship. Deep tanks Nos. 1 and 2 with approximately 16,000 cubic feet of capacity may be used for dry or liquid cargoes if not in use for vessel voyage requirements. No. 3 deep tank is rigged for either fuel oil or bulk cargo liquids. A 5,000-barrel (703 long tons) payload can be shipped in this tank if the contemplated voyage is to be short enough that No. 3 tank will not be needed for the vessel.

³ Standard C3 has no refrigerated cargo capacity; the figure given is for the C3 passenger and cargo types.

⁴ Standard C4 has no refrigerated cargo capacity; figures given are for C4-S-A4 type.

⁵ Modified Liberty.

⁶ Supertankers are tankers over 25,000 deadweight tonnage, which run up to 100,000 deadweight tonnages or higher.

Table VI. Hold Capacities (Merchant Ships)

Ship type	Hatch number	Hatch dimensions	Cargo capacities in measurement tons		
			Hold	'Tween deck	Deep tanks
Liberty-----	1	33 ft 9 in. X 20 ft-----	900	985	416
	2	35 ft 0 in. X 20 ft-----	2,300	1,065	0
	3	20 ft 0 in. X 20 ft-----	1,495	597	0
	4	35 ft 0 in. X 20 ft-----	1,315	742	0
	5	35 ft 0 in. X 20 ft-----	1,300	771	0
Total-----		-----	7,310	4,160	416
FS Freighter-----	1	16 ft 0 in. X 20 ft 0 in-----	251	0	0
	2	16 ft 0 in. X 28 ft 0 in-----	285	0	0
Total-----		-----	536	0	0

Table VI. Hold Capacities (Merchant Ships)—Continued

Ship type	Hatch number	Hatch dimensions	Cargo capacities in measurement tons			
			Hold	Upper 'tween deck	Lower 'tween deck	Deep tanks
Victory.....	1	22 ft 3 in.×25 ft.....	693	466	588	0
	2	22 ft 3 in.×24 ft.....	675	675	545	0
	3	22 ft 3 in.×36 ft.....	1,320	1,139	989	0
	4	22 ft 3 in.×36 ft.....	1,276	1,224	0	0
	5	22 ft 4 in.×24 ft.....	647	1,086	0	0
Total.....			4,611	4,590	2,122	0
C1-B.....	1	29 ft 3 in.×20 ft.....	862	481	398	0
	2	31 ft 6 in.×20 ft.....	1,437	750	741	0
	3	31 ft 6 in.×20 ft.....	1,222	845	779	102
	4	31 ft 6 in.×20 ft.....	0	779	1,229	480
	5	31 ft 6 in.×20 ft.....	608	473	0	0
Total.....			4,129	3,328	3,147	582
C1-M-AV1.....	1	20 ft 2 in.×19 ft 11 in.....	472	509	0	0
	2	18 ft 10 in.×14 ft 11 in.....	1,100	924	0	0
	3	40 ft 4 in.×19 ft 10 in.....	875	612	0	0
	4	8 ft 0 in.×8 ft 0 in.....	113	36	133	0
Total.....			2,560	2,081	133	0

Mariner-----	1	24 ft 3 in. X 18 ft 6 in.-----	305	402	453	0
	2	30 ft 0 in. X 24 ft 0 in.-----	637	731	865	0
	3	40 ft 0 in. X 30 ft 0 in.-----	1,284	1,050	1,454	0
	4	40 ft 0 in. X 30 ft 0 in.-----	1,528	1,006	1,500	0
	5	40 ft 0 in. X 30 ft 0 in.-----	401	1,044	410	953
	6	40 ft 0 in. X 30 ft 0 in.-----	1,646	965	0	298
	7	25 ft 0 in. X 30 ft 0 in.-----	856	627	0	0
Total-----		-----	6,657	5,825	4,682	1,251

Table VII. Payload Capacities (Merchant Ships)

Vessel	Maximum ship- operating supplies (long tons)*	Cargo capacity tonnage less operating supplies (long tons)*	Total (long tons)
Liberty-----	2,800	8,000	10,800
Victory-----	3,100	7,500	10,600
C1-B-----	1,850	7,250	9,100
C1-M-AV1-----	1,047	6,393	7,440
Mariner-----	4,065	9,353	13,418

* Operating supplies include fuel, water, dunnage, and ship stores. Additional payload capacity may be substituted to a limit dependent on length of voyage and character of cargo which will warrant a reduction in such ship-operating supplies.

Table VIII. Vehicle Loading Capacities (Merchant Ships)

Vessel	Trucks, $\frac{1}{4}$ -ton*	Trailers, $1\frac{1}{2}$ -ton*	Trucks, cargo, $\frac{1}{4}$ -ton*	Trucks, cargo, $2\frac{1}{2}$ -ton, 6×6 (LWB)*	Trucks, cargo, 5-ton, 6×6 (LWB)*
Liberty.....	498	404	312	**185	102
Victory.....	512	512	331	193	114
C1-B.....	511	491	337	182	145
C1-M-AV1.....	314	261	167	111	61
Mariner.....	1,181	891	665	364	229

* Double the number of $\frac{1}{4}$ -ton trucks on wheels can be stowed if they are stacked. It is estimated that at least 35 percent more $1\frac{1}{2}$ -ton trailers can be loaded if stowed in tandem with drawbar nested inside body of preceding trailer, provided tailgates are drop type. More $\frac{1}{4}$ -ton, $2\frac{1}{2}$ -ton, and 5-ton trucks can be stowed in the Liberty ship by double-decking. (See note to C1-B table.)

** 153 $\frac{1}{4}$ -ton trucks may be loaded in the bodies of 153 of these trucks. The other 32 trucks will not take $\frac{1}{4}$ -ton trucks because of the limiting height of the compartments in which stowed. As an alternative, a total of 215 trucks can be stowed by double-decking in Nos. 2 and 3 holds.

C1-B*

Hatch No.	Location	Trucks, utility, $\frac{1}{4}$ -ton	Trailers, cargo, $1\frac{1}{2}$ -ton	Trucks, cargo, $\frac{1}{4}$ -ton	Trucks, cargo, $2\frac{1}{2}$ -ton, 6×6, LWB	Trucks, cargo, 5-ton, 6×6, LWB
1	On deck.....	14	14	12	5	7
	Upper 'tween deck.....	21	18	12	6	4
	Lower 'tween deck.....	21	18	12	6	5
	Lower hold.....	14	13	9	4	4
2	On deck.....	25	21	18	12	7
	Upper 'tween deck.....	46	37	25	13	12
	Lower 'tween deck.....	42	37	25	15	12
	Lower hold.....	34	36	21	13	11

3	On deck.....	23	21	14	10	5
	Upper 'tween deck.....	44	42	30	17	12
	Lower 'tween deck.....	41	42	28	13	12
	Lower hold.....	41	42	28	13	9
4	On deck.....	21	21	14	10	7
	Upper 'tween deck.....	39	41	26	14	12
	Lower 'tween deck.....	36	37	24	12	10
5	On deck.....	16	18	12	7	5
	'tween deck.....	23	23	15	7	5
	Hold.....	10	10	12	6	6

Liberty ship

1	On deck.....	22	22	14	9	6
	'tween deck.....	28	27	23	12	8
	Lower hold.....	28	24	18	10	5
2	On deck.....	41	36	20	13	8
	'tween deck.....	54	44	30	21	12
	Lower hold.....	48	42	^b 30	^b 18	12
3	On deck.....	22	14	10	6	4
	'tween deck.....	36	28	25	14	6
	Lower hold.....	32	28	^b 22	^b 12	6
4	On deck.....	31	20	16	11	6
	'tween deck.....	41	37	27	16	8
	Lower hold.....	20	15	18	10	2

See footnotes at end of table.

Table VIII. *Vehicle Loading Capacities (Merchant Ships)*—Continued

Liberty ship—Continued						
Hatch No.	Location	Trucks, utility, ¼-ton	Trailers, cargo, 1½-ton	Trucks, cargo, ¾-ton	Trucks, cargo, 2½-ton, 6×6, LWB	Trucks, cargo, 5-ton, 6×6, LWB
5	On deck.....	31	22	14	11	6
	'tween deck.....	44	34	25	16	9
	Lower hold.....	20	11	20	6	2
Victory ship						
1	On deck.....	14	12	6	5	4
	Upper 'tween deck.....	15	16	9	5	0
	Lower 'tween deck.....	16	18	9	6	3
	Hold.....	15	13	8	4	3
2	On deck.....	18	16	12	7	4
	Upper 'tween deck.....	29	26	17	10	4
	Lower 'tween deck.....	25	24	17	10	5
	Hold.....	21	21	14	8	3
3	On deck.....	25	29	18	13	8
	Upper 'tween deck.....	48	48	29	17	12
	Lower 'tween deck.....	46	46	30	18	12
	Hold.....	44	46	30	18	8
4	On deck.....	23	25	18	13	8
	'tween deck.....	49	48	34	16	14
	Hold.....	49	49	31	18	13

5	On deck.....	25	25	17	6	4
	'tween deck.....	30	31	20	12	6
	Hold.....	20	19	12	7	3
C1-M-AV1						
1	On deck.....	20	14	13	7	4
	'tween deck.....	30	23	16	10	3
	Hold.....	16	13	7	4	2
2	On deck.....	30	24	18	10	8
	'tween deck.....	51	46	28	19	10
	Hold.....	51	45	28	19	10
3	On deck.....	28	22	14	10	6
	'tween deck.....	44	37	27	17	9
	Hold.....	44	37	26	15	9
Mariner						
1	On deck.....	20	20	11	7	4
	Upper 'tween deck.....	20	16	12	6	4
	Lower 'tween deck.....	14	10	9	4	0
	Hold.....	9	5	6	3	0

See footnotes at end of table.

Table VIII. *Vehicle Loading Capacities (Merchant Ships)*—Continued

Mariner—Continued						
Hatch No.	Location	Trucks, utility, ¼-ton	Trailers, cargo, 1½-ton	Trucks, cargo, ¾-ton	Trucks, cargo, 2½-ton, 6×6, LWB	Trucks, cargo, 5-ton, 6×6, LWB
2	On deck.....	33	23	20	10	7
	Upper 'tween deck.....	37	23	22	11	7
	Lower 'tween deck.....	26	21	15	9	7
	Hold.....	15	11	9	5	2
3	On deck.....	52	42	30	20	10
	Upper 'tween deck.....	61	48	38	25	13
	Lower 'tween deck.....	52	44	32	21	13
	Hold.....	36	32	22	14	9
4	On deck.....	52	36	26	18	10
	Upper 'tween deck.....	69	46	38	20	14
	Lower 'tween deck.....	69	46	38	20	14
	Hold.....	56	44	30	16	12
5	On deck.....	54	36	28	20	12
	Upper 'tween deck.....	72	56	42	18	14
	Lower 'tween deck.....	74	58	44	° 18	° 14
	Hold.....	72	56	42	° 16	° 12
	Deep tank.....	36	28	14	6	2
6	On deck.....	54	40	30	20	12
	'tween deck.....	65	47	36	18	14
	Hold.....	34	30	20	12	9
	Deep tank.....	10	4	0	0	0

7	On deck.....	37	27	22	12	7
	'tween deck.....	42	33	23	11	7
	Hold.....	10	9	6	4	0

* Number of vehicles (except 5-ton, 6×6) in lower hold of No. 2 and 3 hatches can be doubled by flooring over one layer of vehicles and loading a second layer directly on top. Only these two holds are deep enough to permit double-decking.

^b Based on no centerline bulkhead, which may or may not be standard equipment.

^c On nonrefrigerated type only. Approximately three 5-ton trucks or four 2½-ton trucks can be loaded on these decks on refrigerated vessels.

Note. The figures contained in this table reflect general loading conditions and by no means represent the maximum vehicle capacities of the vessels. With the exception of crated vehicles, no allowance has been made for stacking or double-decking. All below-deck stowage is fore and aft except ¼-ton trucks and 1½-ton trailers, which are stowed both fore and aft and athwartship.

APPENDIX VI

TYPICAL CARGO MARKINGS

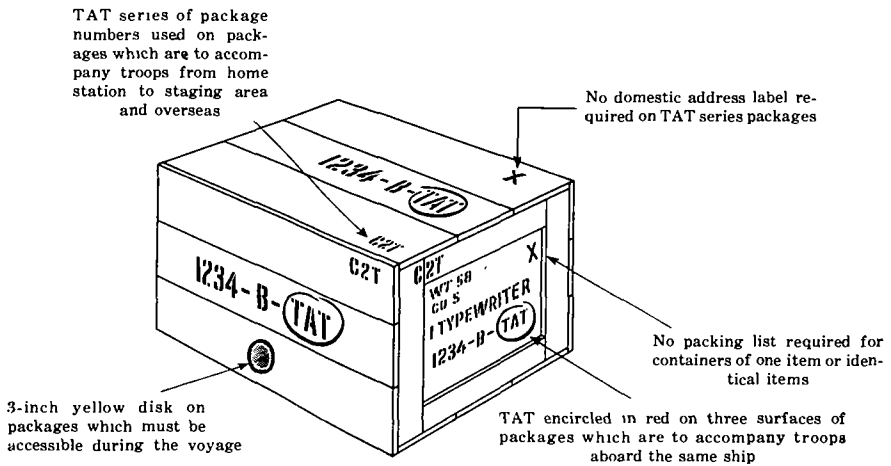


Figure 25. Marking of impediments (TAT box).

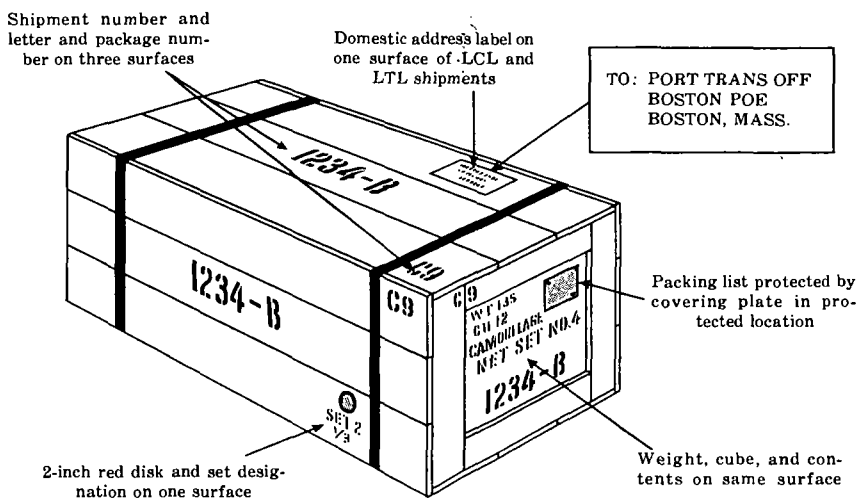
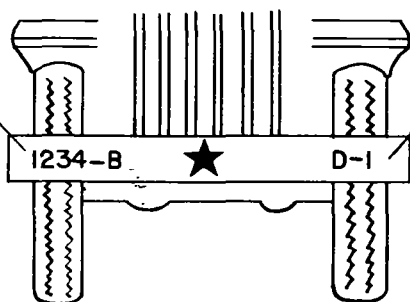


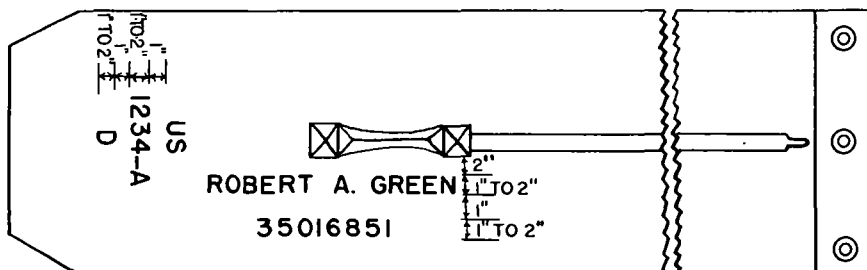
Figure 26. Marking of impedimentà (box).

SHIPMENT NUMBER AND LETTERS
ON FRONT AND REAR BUMPERS.

PACKAGE NUMBER. THIS
IS VEHICLE #1 OF GO D.

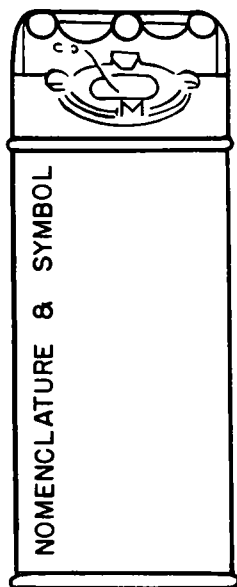


(A)

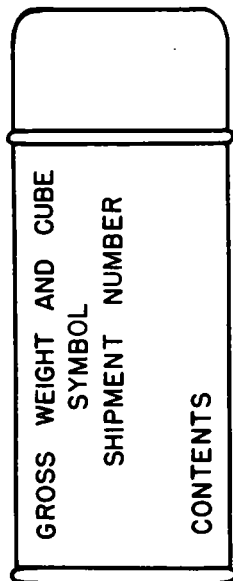


(B)

Figure 27. Marking of impedimenta: (A) vehicle, (B) duffle bag.



FRONT VIEW



BACK VIEW

BLOCK LETTERS $\frac{3}{4}$ INCH, $\frac{1}{2}$ INCH BETWEEN LINES

Figure 28. Marking of 5-gallon gasoline can (military).



RADIATION HAZARD

PRECAUTIONS _____

DATE _____

COLOR SCHEME
LETTERS: "DANGER" WHITE
OTHER LETTERING: RED
SYMBOL & ELLIPTICAL BACKGROUND -
MAGENTA
BASIC BACKGROUND - YELLOW

SYMBOL FOR RADIATION HAZARD MARKING

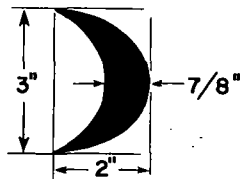


FRAGILE LABEL

USE NO HOOKS



SYMBOL FOR "USE NO HOOKS"



CRESCENT SYMBOL FOR
 SUBSISTENCE ITEMS



SYMBOL FOR MEDICAL SERVICES OF
 THE ARMED FORCES

Figure 30. Typical armed forces marking symbols.



ORDNANCE CORPS



SIGNAL CORPS



BUREAU OF AERONAUTICS



BUREAU OF ORDNANCE



QUARTERMASTER CORPS



CHEMICAL CORPS

BUREAU OF YARDS
AND DOCKSBUREAU OF
SHIPSBUREAU OF SUPPLIES
AND ACCOUNTS

CORPS OF ENGINEERS



COAST GUARD



MARINE CORPS

Figure 31. Typical Army and Navy marking symbols.

APPENDIX VII
ASSAULT CRAFT AND AMPHIBIOUS SHIPS
EMPLOYED IN AMPHIBIOUS OPERATIONS

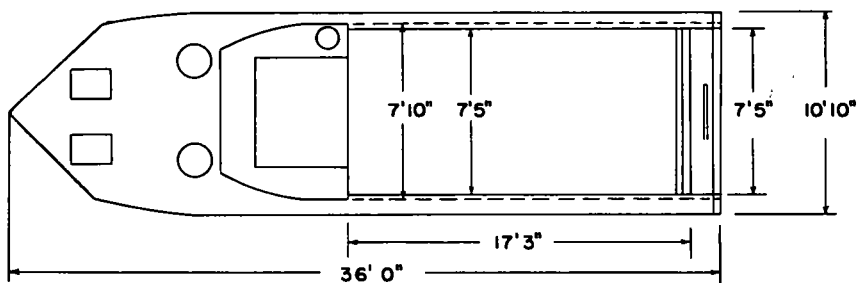
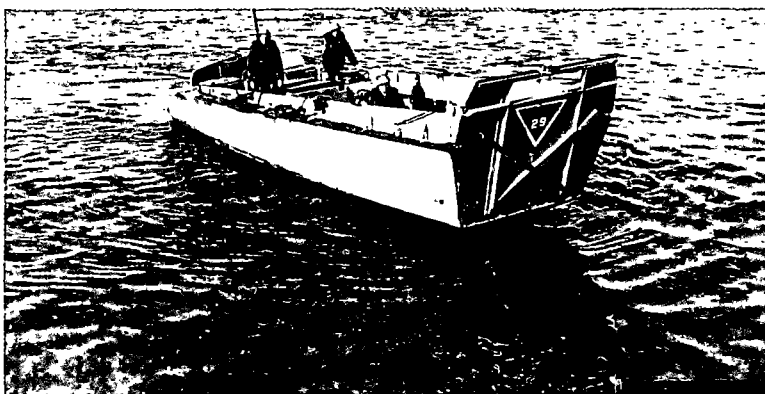


Figure 32. Landing craft, vehicle and personnel (LCVP).

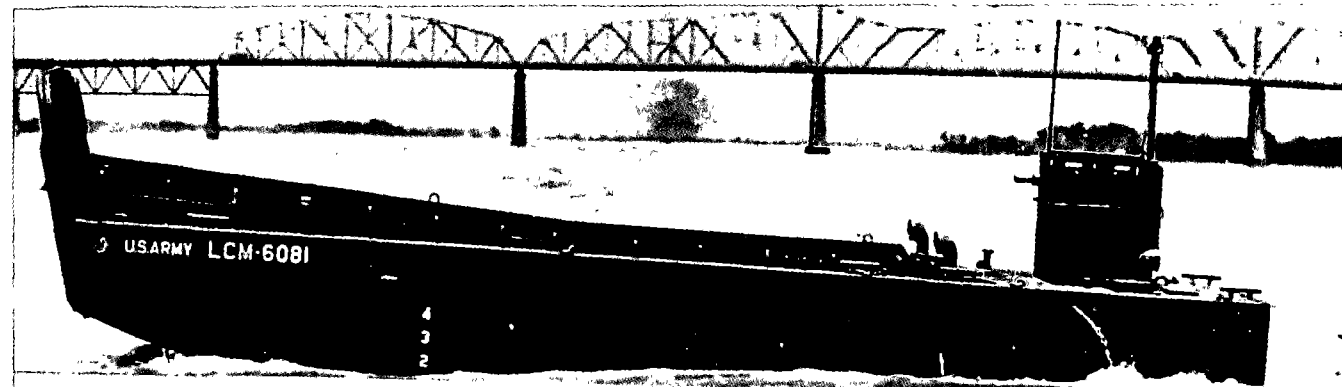
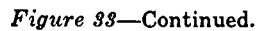


Figure 33. Landing craft, mechanized (LCM(6)).



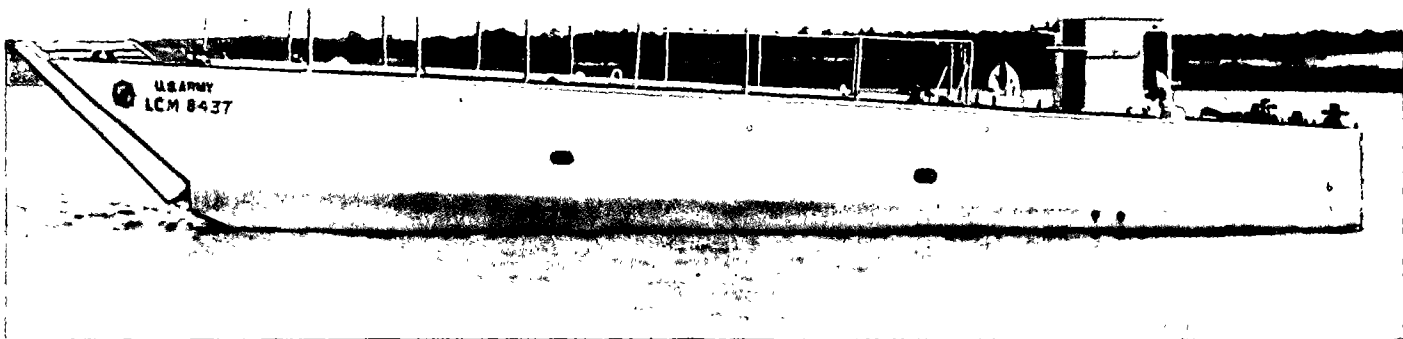
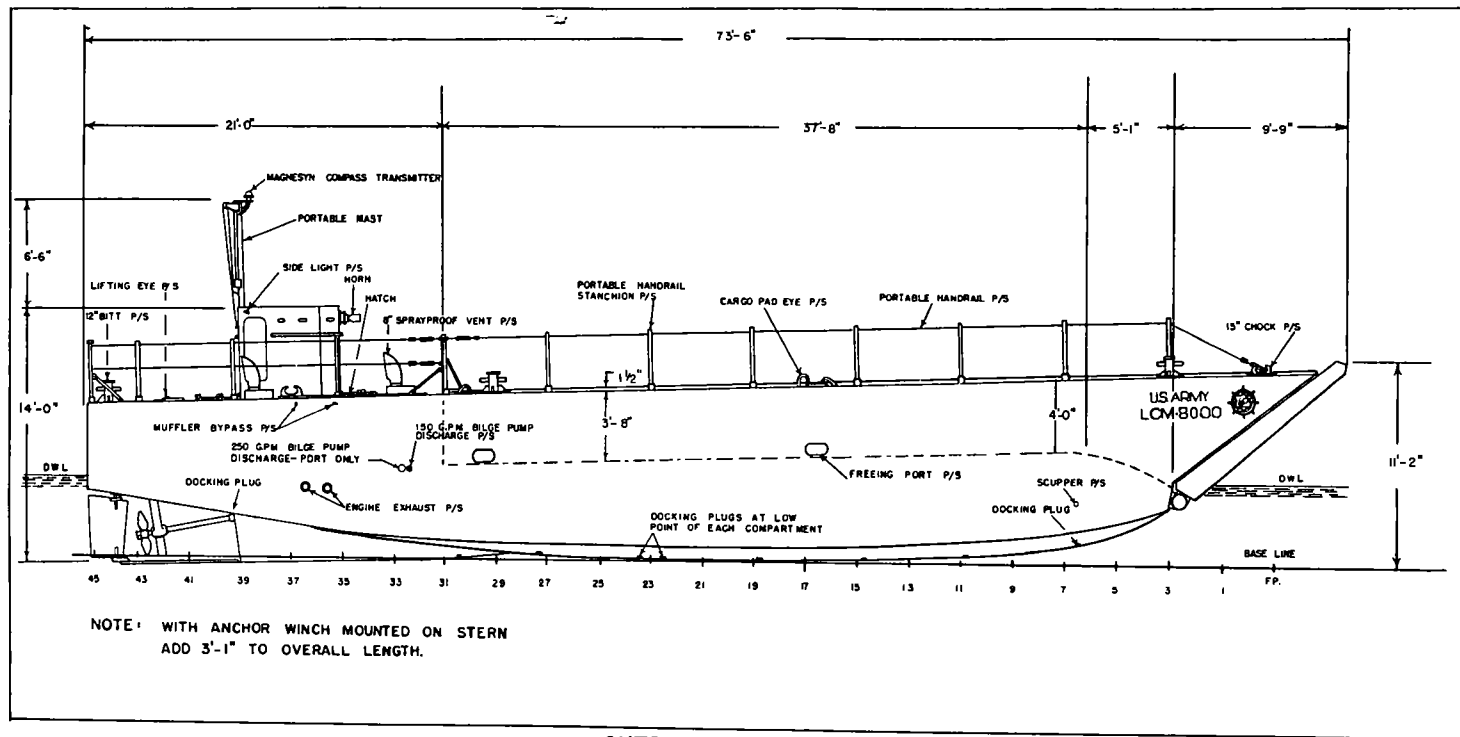


Figure 34. Landing craft, mechanized (LCM(8)).



OUTBOARD PROFILE

Figure 34—Continued.

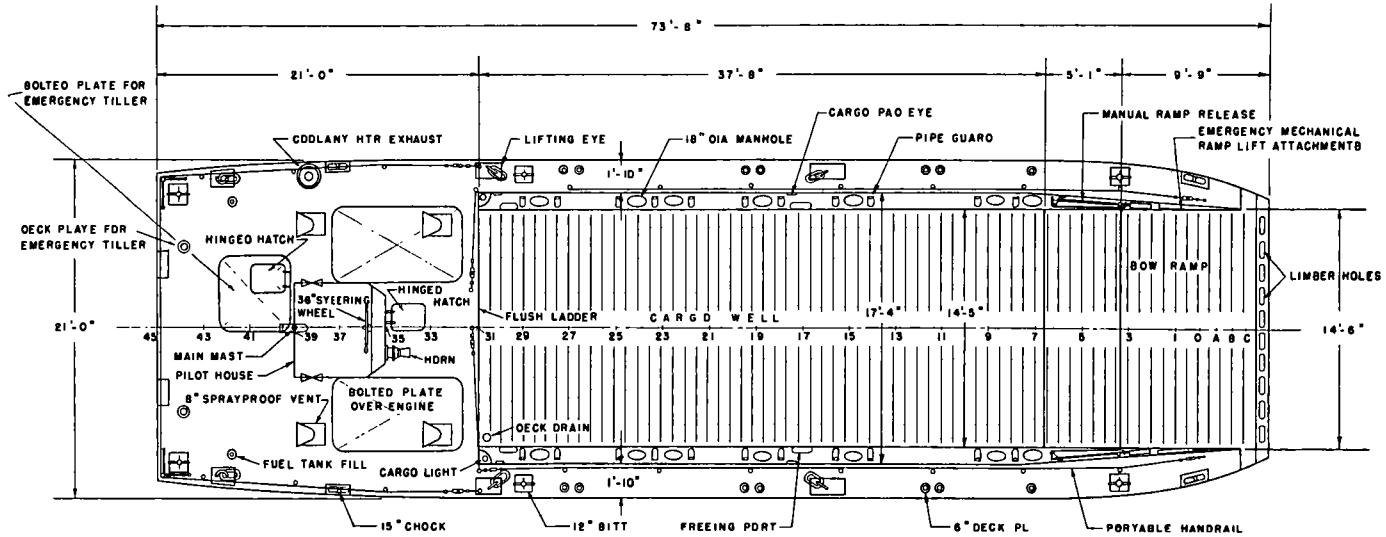


Figure 34—Continued.

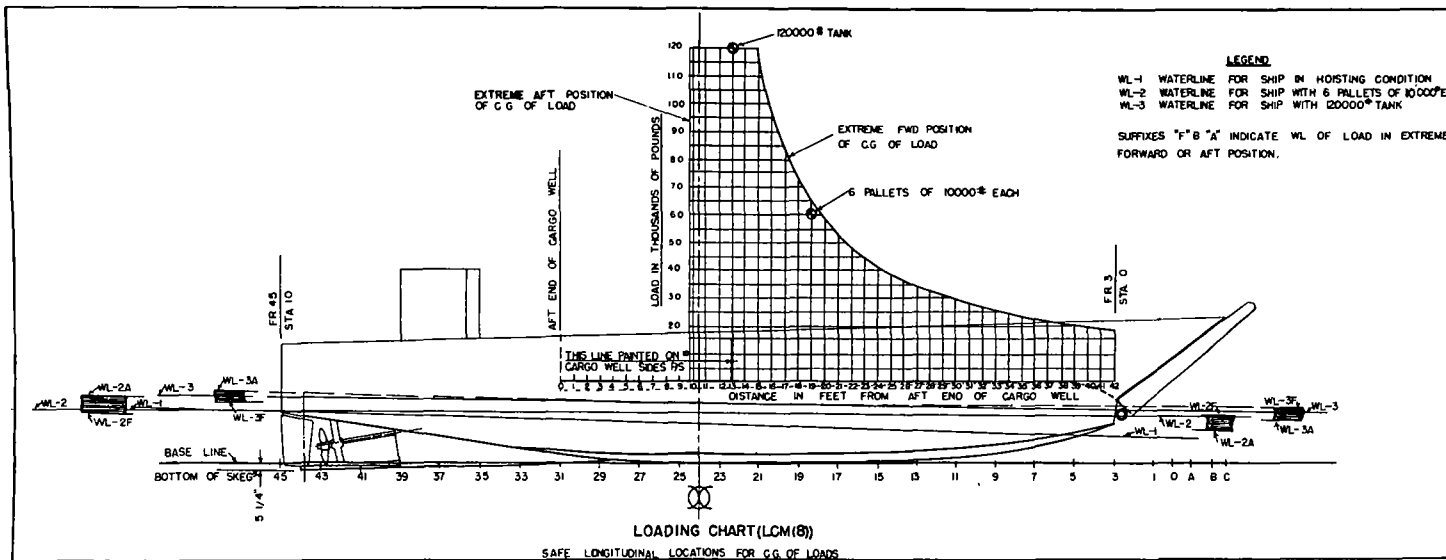


Figure 34—Continued.

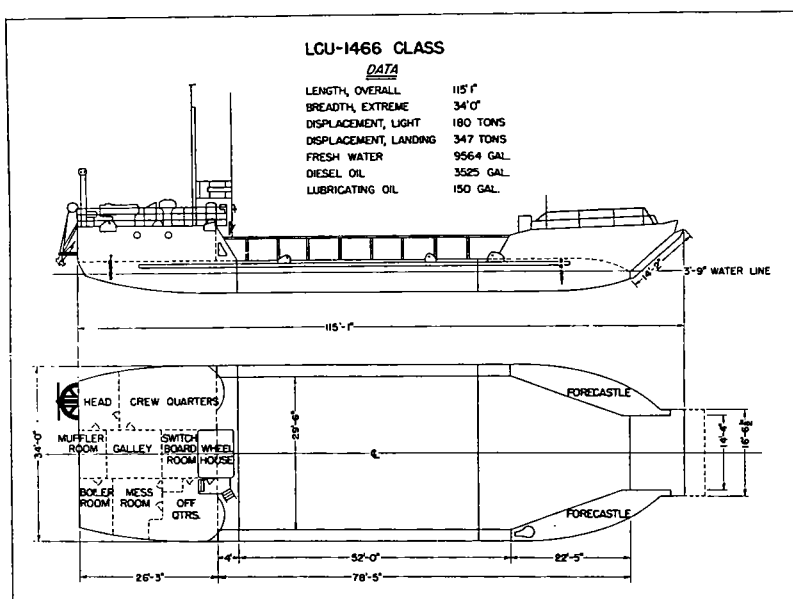
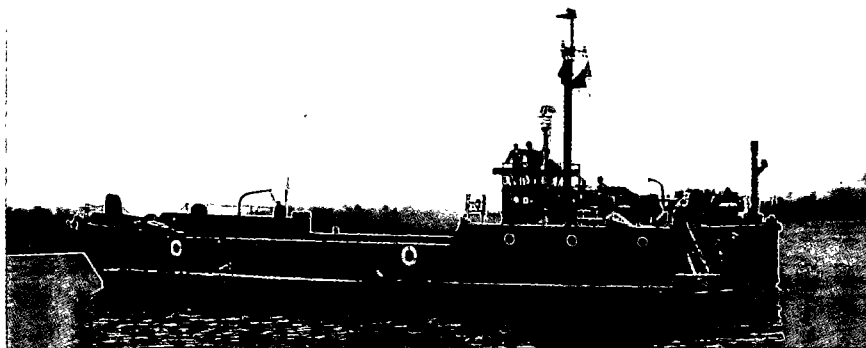


Figure 35. Landing craft, utility (LCU) (1466 class).

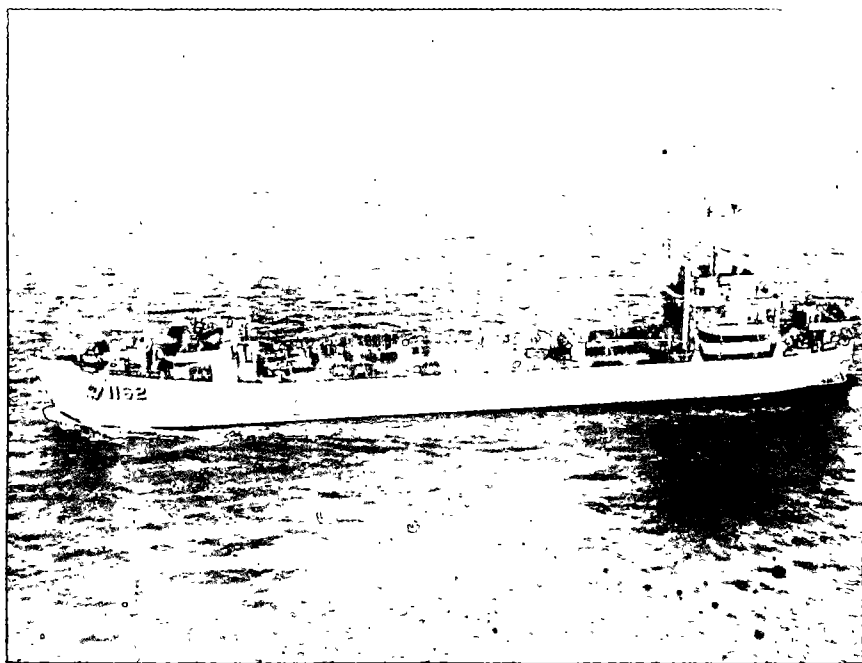
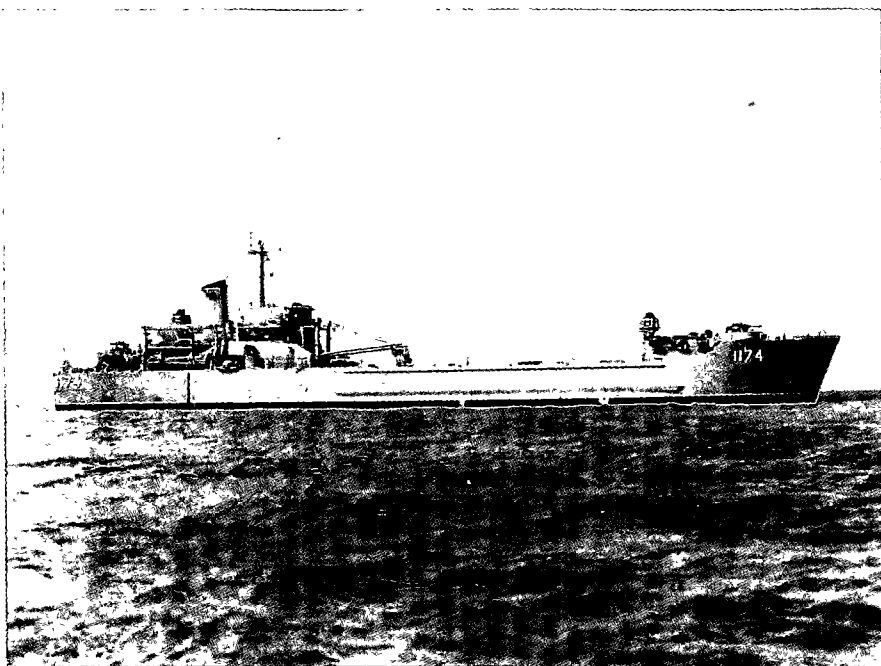
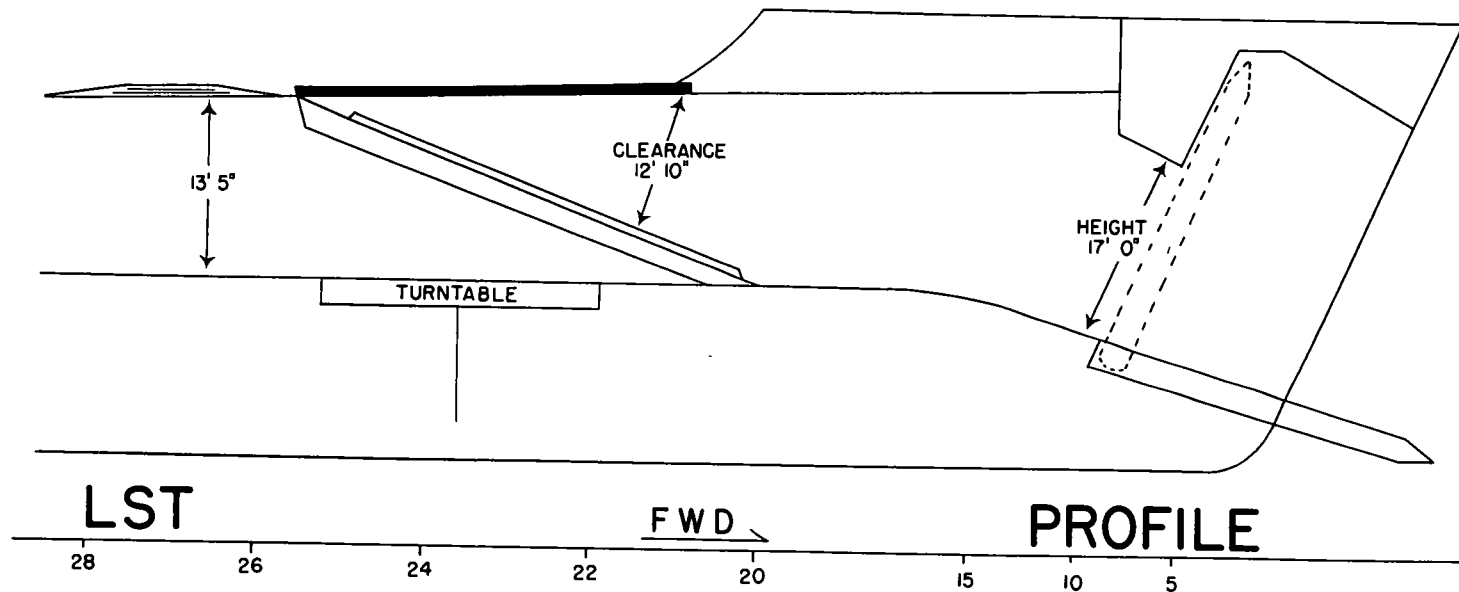


Figure 36. Landing ship, tank (LST) (1156 class).



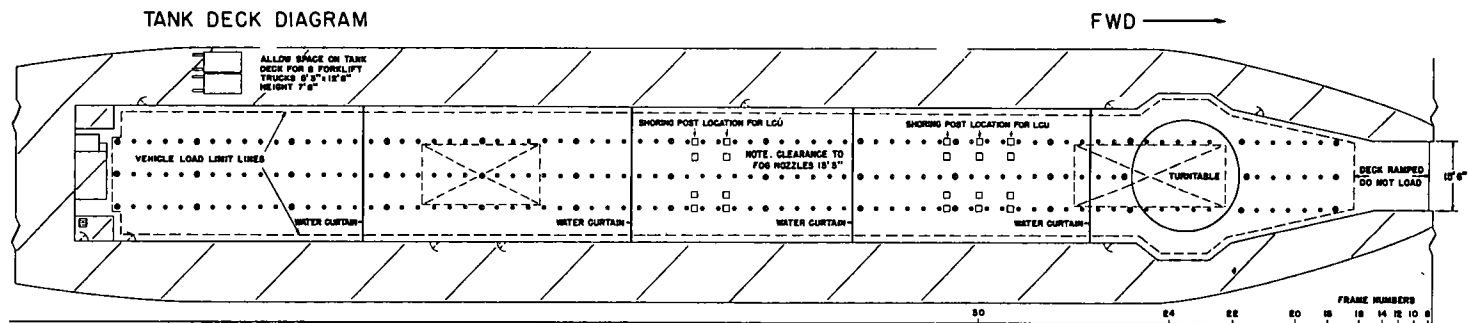
1. Landing ship, tank.

Figure 37. Landing ship, tank (LST) (Suffolk County class).



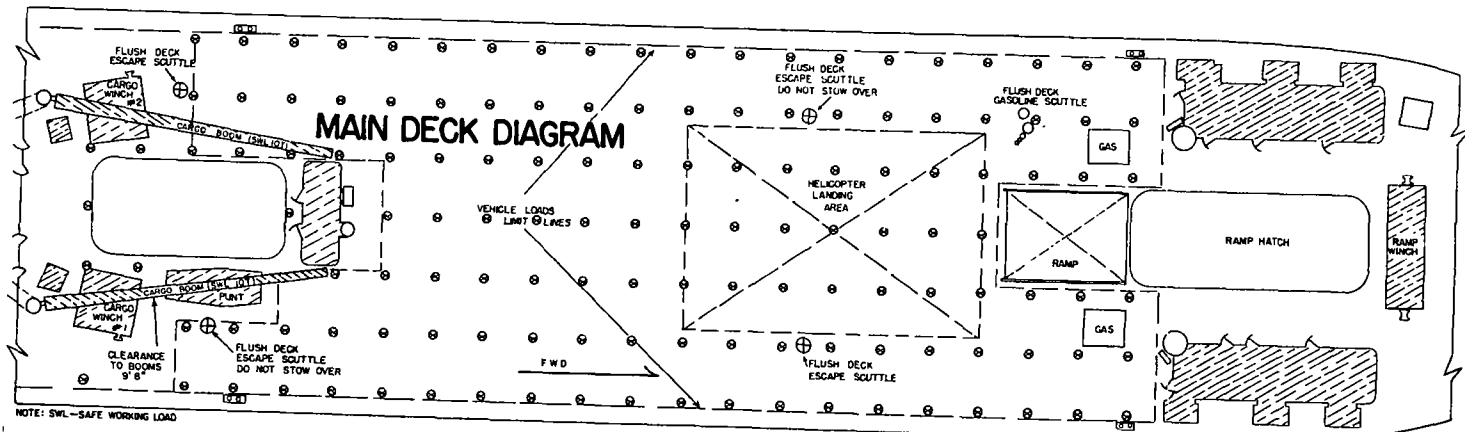
2. Profile of bow section

Figure 37—Continued.



3. Tank deck diagram

Figure 37—Continued.



FM 40-30
Figure 37 Main Deck Diagram (Buffalo County Class) App VII.

4. Main deck diagram

Figure 37—Continued.

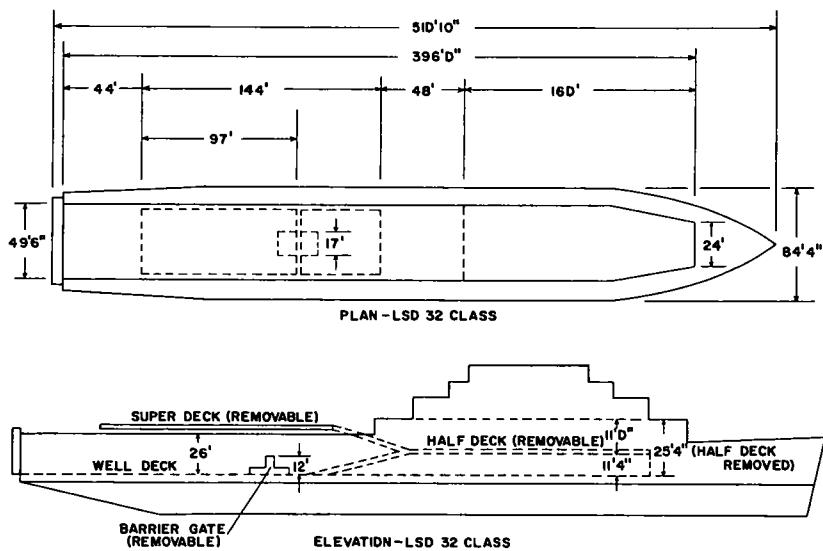
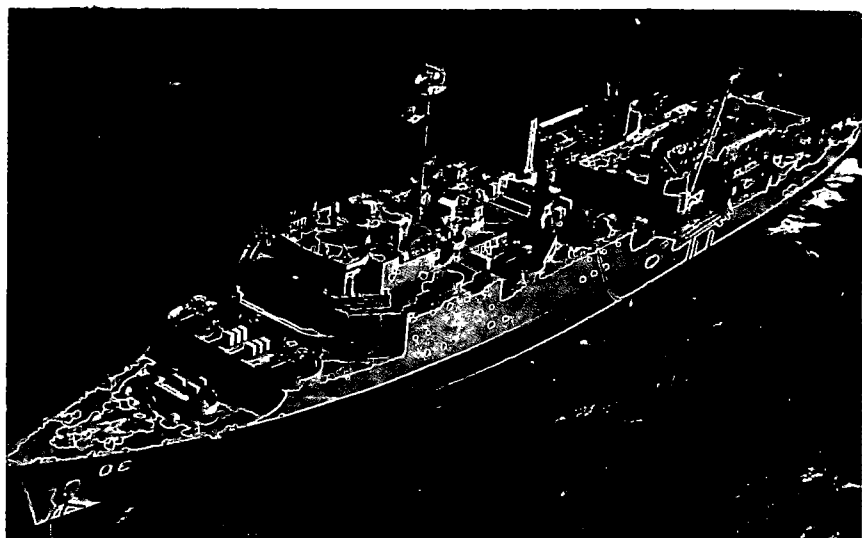


Figure 38. Landing ship, dock (LSD).

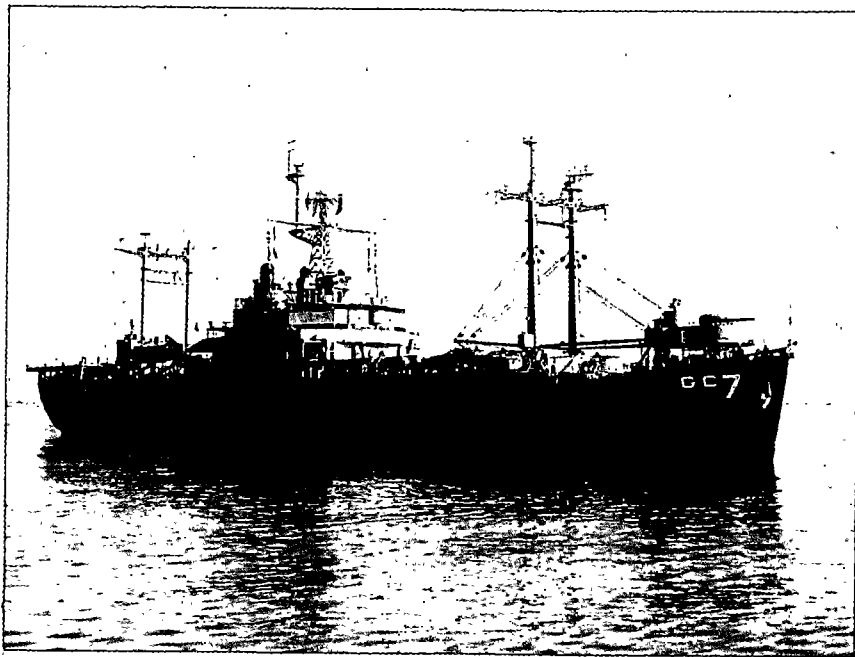


Figure 39. Amphibious force flagship (AGC).

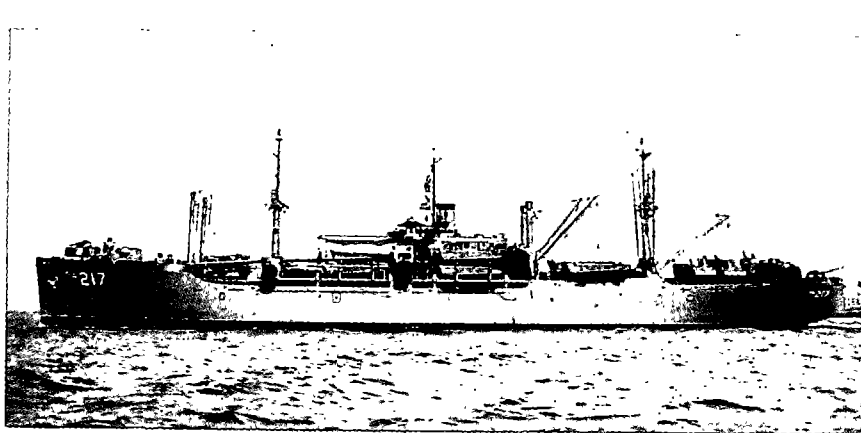


Figure 40. Typical attack transport (APA).



Figure 41. Typical attack cargo ship (AKA).

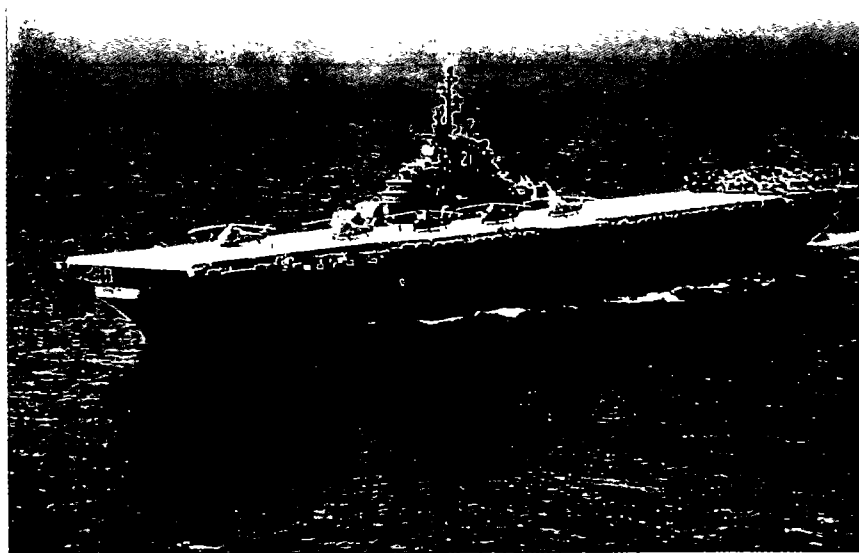


Figure 42. Amphibious assault ship (LPH) (Essex class).

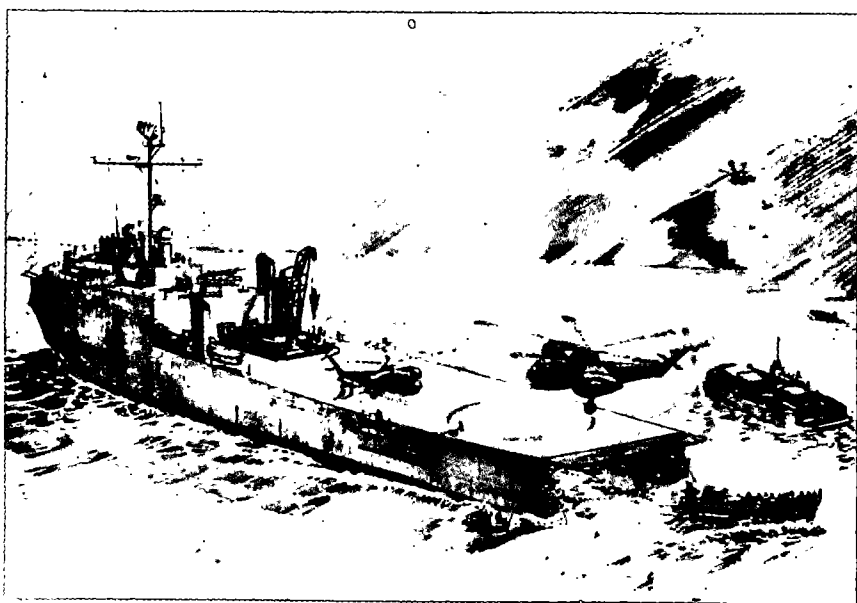


Figure 43. Amphibious transport, dock (LPD) (artist's conception).

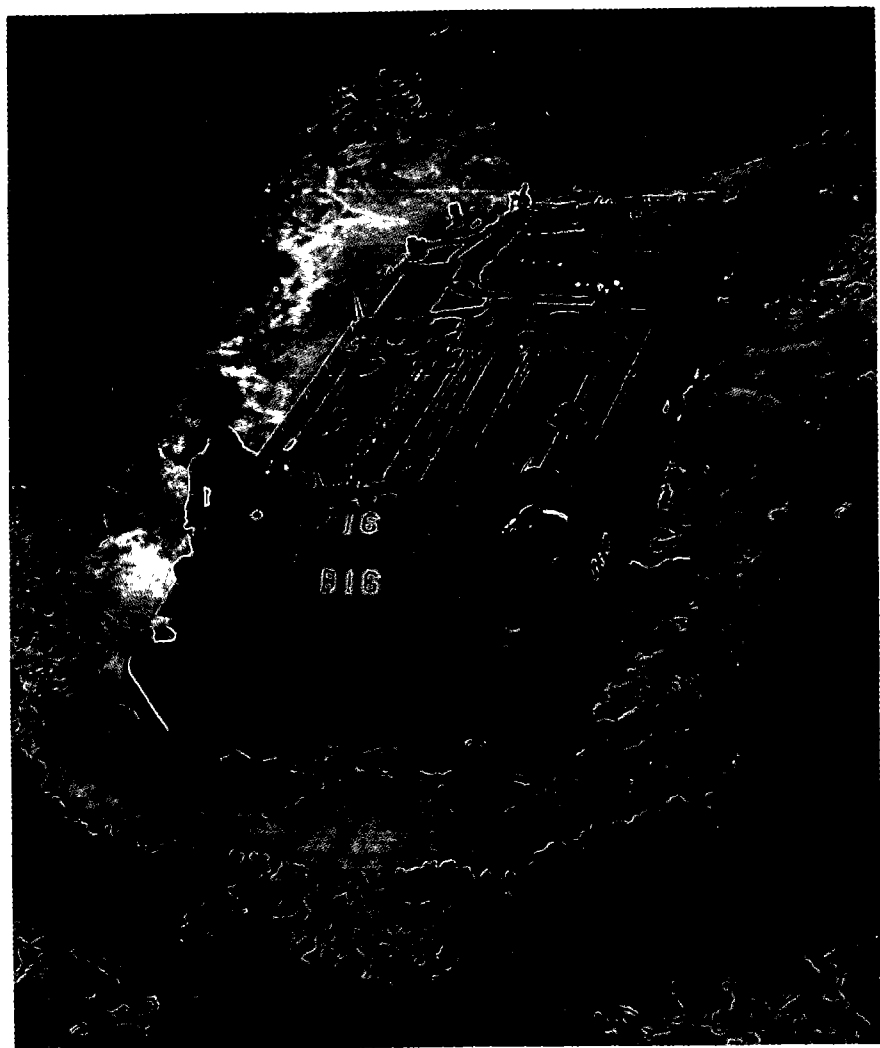


Figure 44. Landing vehicle, tracked, personnel (LVTP(5)).

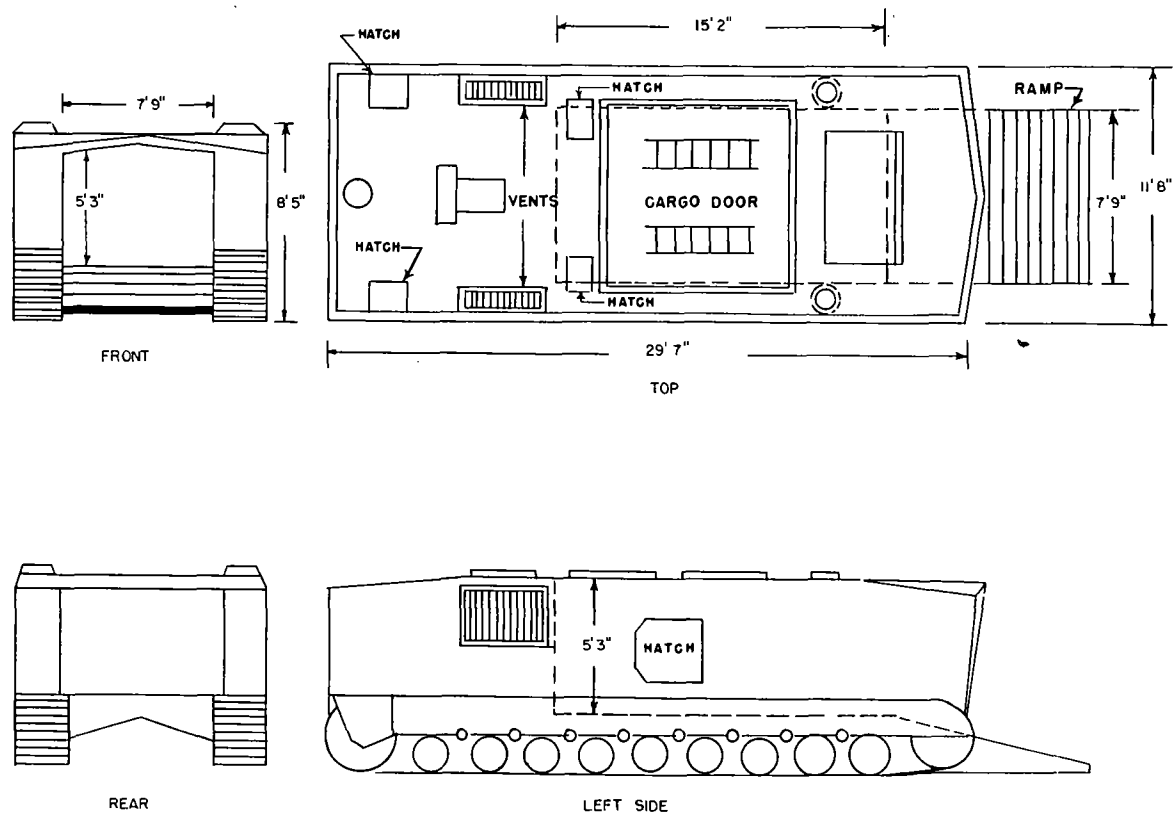


Figure 44—Continued.



Figure 45. Truck, amphibious, 2½-ton (DUKW).

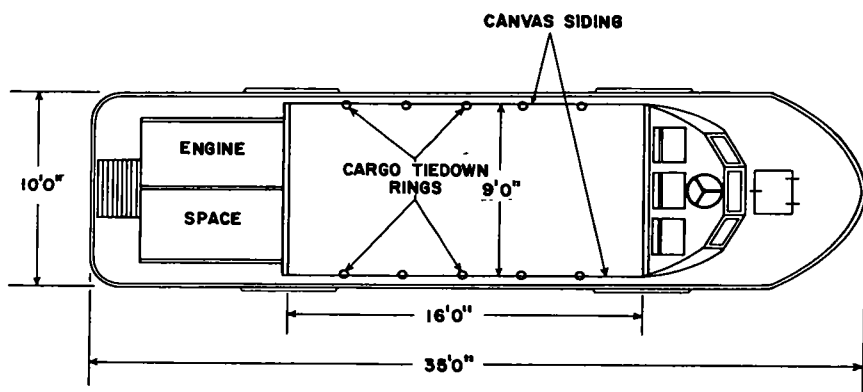
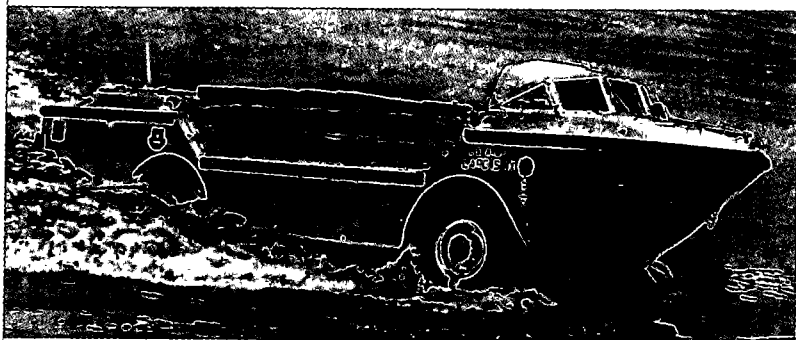


Figure 46. *Lighter, amphibious, resupply, cargo, 5-ton (LARC-5).*

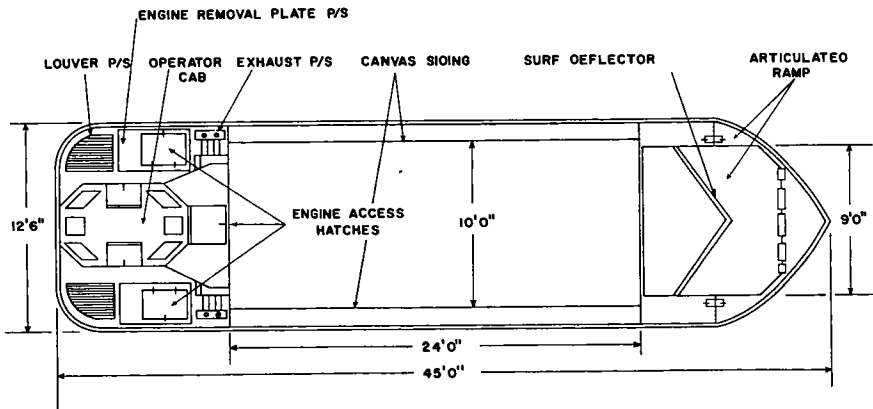


Figure 47. Lighter, amphibious, resupply, cargo, 15-ton (LARC-15).

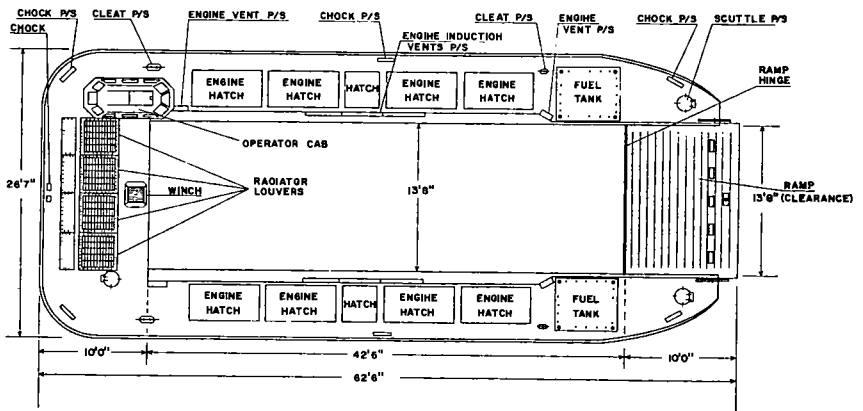
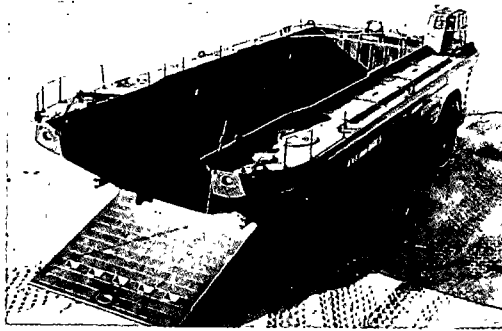


Figure 48. Lighter, amphibious, 60-ton (BARC).

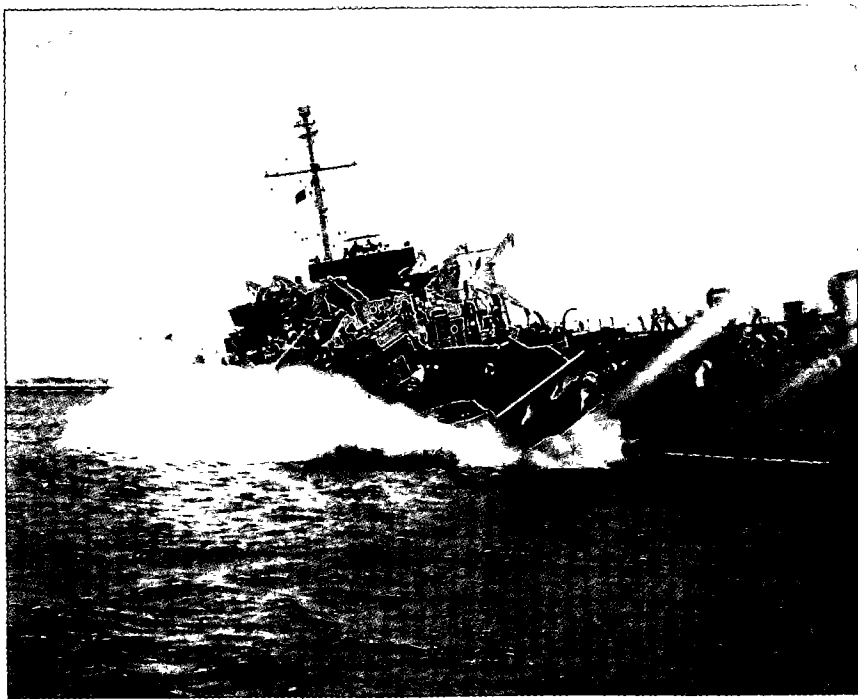


Figure 49. Launching an LCU from the deck of an LST.

GLOSSARY

Terms Used in Amphibious Operations (Embarkation Phase)

The terms and definitions listed below are, for most part, those which are normally used by naval tactical planners but which are not included in JSC 1, Dictionary of United States Military Terms for Joint Usage. Terms and definitions used in FM 60-30 which differ from the definitions contained in the joint dictionary have also been included.

Amphibious operation—An attack launched from the sea by naval and landing forces embarked in ships and craft, involving a landing on a hostile shore.

Assault craft unit (ACU)—a permanently commissioned naval organization subordinate to the commander of the naval beach group, which contains landing craft and crews necessary to provide additional landing means required in an amphibious operation.

Basic decisions—Those decisions which must be made at the highest level within an amphibious task force before detailed planning for an amphibious operation can proceed.

Battle group (BG)—One of five major subordinate infantry commands within the Army infantry division. Five rifle companies, a combat support company, and a headquarters company comprise a battle group.

Battle group landing team (BGLT)—In an amphibious operation, an infantry battle group reinforced with other combat and service units to comprise an organization suitable for an amphibious assault.

Beach—The area extending from the shoreline inland to a marked change in physiographic form or material or to the line of permanent vegetation (coastline).

Beach group, naval—A permanently organized naval command within an amphibious force, consisting of a headquarters unit, a beachmaster unit, an amphibious construction battalion, and an assault craft unit. It is designed to provide an administrative group from which required naval tactical components may be made available to the attack force commander and to

the landing force commander to support the landing of one division.

Block stowage—A method whereby various types of cargo such as ammunition, rations, or boxed vehicles are stowed separately. Thus, a balanced proportion of the entire cargo may be discharged without disturbing the remainder of the cargo.

Brigade landing team (BdeLT)—Two or more ROAD battalions reinforced with other combat and service units to comprise an organization suitable to amphibious assault.

Canal tonnage (Panama or Suez)—Derived from formulas of measurement prescribed by the respective canal authorities for the assessment of tolls. Space exemptions allowed are not uniform for the two canals, and, as a consequence, ships must carry a certificate for each.

Cargo deadweight tonnage—The total cargo and passenger capacity of a ship expressed in long tons. The figure is computed by deducting the weight of the fuel, water, stores, dunnage, and other items necessary for a voyage from the deadweight tonnage of the vessel.

Consolidation phase—The period during which the beachhead, advanced base area, or area to be denied to the enemy is made secure, and any necessary tactical and logistic buildup is begun.

Consolidated vehicle table—A two-part summary of all vehicles embarked by each unit within the organization for embarkation. The first part lists each unit and the total number of vehicles by type embarked on the shipping assigned to the embarkation organization. The second part lists each unit and the number of vehicles by type embarked on each ship assigned to the embarkation organization.

Deadweight tonnage—The carrying capacity of a ship in long tons. It represents the difference between the displacement light and the displacement loaded to the maximum draft allowed by law.

Displacement tonnage, light—The weight of the ship in long tons excluding cargo, passengers, fuel, water, stores, dunnage, and other items necessary for use on a voyage.

Displacement tonnage, loaded—The weight of the ship in long tons, including cargo, passengers, fuel, water, stores, dunnage, and such other items as necessary for use on a voyage.

Embarkation area—An area ashore, including a group of embarkation points, in which final preparations for embarkation are

completed and from and through which assigned loads for craft and ships are called forward to embark.

Embarkation officer—(See also Embarkation organization.) An officer serving on an Army, Air Force, or Marine Corps special staff who advises the commander thereof of matters pertaining to embarkation planning and loading and embarkation of landing force units aboard ships. The designation of personnel at specific command levels is accomplished by an appropriate prefix to the basic title; for example, unit embarkation officer.

Embarkation order—An order, published at division (group) and brigade (unit) levels, specifying organization for embarkation; supplies and equipment to be embarked; embarkation points and cargo assembly areas; control and communication facilities to be established in the embarkation area; movement and embarkation procedures and schedules; and any necessary instructions incident to processing, movement, and embarkation of special cargo or specific troop organizations.

Embarkation organization—A temporary administrative formation of personnel with supplies and equipment embarking or to be embarked (combat loaded) aboard amphibious shipping:

Embarkation team—A temporary administrative formation of all personnel, supplies, and/or equipment embarked, embarking, or to be embarked (combat loaded) aboard one ship.

Embarkation element—A temporary administrative formation composed of two or more embarkation teams grouped together to conform to the organization for landing (normally formed to retain unit integrity of a battalion).

Embarkation unit—A temporary administrative formation composed of two or more embarkation teams or two or more embarkation elements or a combination of teams and elements. Each major component of an Army division normally forms an embarkation unit.

Embarkation group—A temporary administrative formation formed to plan and execute the embarkation of a division. The embarkation group is formed of two or more embarkation units.

Equipment tonnage—This is the tonnage arrived at from certain dimensions which take into consideration the exposed surfaces of the vessel both above and below water. It very closely approximates the gross tonnage in a vessel of ordinary construction. Equipment tonnage is used primarily to determine the

size of anchors, anchor chains, hawse pipes, and other ship's gear.

Floating dump—Emergency supplies loaded in landing craft, amphibious vehicles, or landing ships. Floating dumps are under the control officers and are landed when requested by the appropriate troop commander.

Floating dump area—An offshore area in which are stationed a designated number of landing craft or amphibious vehicles, loaded with emergency supplies to meet early requests from troop commanders ashore.

Followup shipping—Ships not originally a part of the amphibious task force, but which carry supplies and equipment in support of the operation.

General unloading period—The unloading period which is primarily logistic and quantitative in character.

Gross ton—A unit of capacity of 100 cubic feet (2.8317 cubic meters) used for ascertaining the legal or registered tonnage of vessels. Also called *register* or *vessel ton*.

Gross tonnage—The entire internal cubic capacity of a ship expressed in gross tons. Also referred to as *gross register tonnage*.

Horizontal stowage—The lateral distribution of unit equipment or categories of supplies so that they can be unloaded simultaneously from two or more holds.

Initial unloading period—The period of unloading which is primarily tactical in character.

Landing beach—That portion of a shore line usually required for the landing of a battle group landing team. It may also be that portion of a shore line constituting a tactical locality, such as the shore of a bay, over which a landing team may be landed.

Landing ship area—Areas assigned to landing ships before or after the execution of such operations as causeway launching, amphibious vehicle launching, or beaching.

Landing site—A designated area within a landing zone where helicopters can land.

Landing zone—(1) A designated area in which several landing sites are located. (2) A specific zone within an objective area used for the landing of aircraft.

Loading plan—(1) The loading plan of a ship is a consolidation under one cover of all completed forms and diagrams required to plan and execute loading of cargo and embarkation of per-

sonnel on one ship. The completed loading plan consists of the loading plan cover page, the consolidated unit personnel and tonnage table, the consolidated cargo and loading analysis table, the consolidated vehicle summary and priority table, stowage diagrams, and the profile loading diagram. The profile loading diagram is omitted when the organization is embarked in a landing ship or a submarine. Although not part of the loading plan, the consolidated embarkation and tonnage table is normally attached to the loading plan for the convenience of staff officers involved in embarkation planning. (2) The Navy plan covering the organization of Navy forces for loading and including the schedule of arrival and departure of amphibious shipping from embarkation points.

Long ton—A unit of weight, 2,240 pounds (1016.106 kilograms).

Manifest ton—The unit at which cargo is billed or manifested when the carrier has the option to assess freight charges on the basis of a ton weight, or a ton measurement, whichever affords the greater revenue. Also known as a *revenue ton*.

Means—Equipment employed to transport personnel, supplies, and equipment from ship to landing area. Included in surface means are landing craft, landing ships, and amphibious vehicles. Included in aerial means are various types of fixed and rotary wing aircraft.

Measurement ton—A unit of volume for cargo computed at 40 cubic feet. Also called a *freight ton* or *stevedore ton*.

Metric ton—A unit of weight, 2,205 pounds (1000 kilograms).

Net tonnage—The payload spaces remaining after deduction from the gross tonnage of space for the crew, powerplant, fuel, and operation of the vessel. Net tonnage is expressed in gross tons, and is sometimes referred to as *net register tonnage*.

On-call waves—Formations of landing craft, amphibious vehicles, or landing ships carrying those elements of the landing force whose need ashore at an early hour is anticipated, but whose time and place of landing cannot be accurately predicted and are therefore not specified.

Shore party—A special task organization of the landing force, formed to facilitate landing and movement off the beaches of troops, equipment, and supplies and to evacuate from the beaches casualties and prisoners of war. Its activation and command are functions of the landing force.

Short ton—A unit of weight, 2,000 pounds (907.2 kilograms).

Stowage factor—The figures that denotes the number of cubic feet required to stow one long ton of cargo. This factor is obtained by dividing 2,240 pounds by the weight, in pounds, of a cubic foot of the commodity to be loaded.

Tactical-logistical group—A group organized from personnel within the landing force embarkation organization to advise control officers promptly of landing force requirements during the ship-to-shore movement.

Vertical stowage—A method of stowage within a single compartment by which selected items of supply are continually accessible for unloading without prior unloading of other cargo in the same compartment.

Abbreviations Used on Blueprints (Navy)

Aft. B.	after body	Fl. Pl.	flange plate
A. L.	accommodation ladder	Focastle. Dk.	forecastle deck
A. P.	after perpendicular	Fwd.	forward
A. S.	angle stiffener	F. P.	forepeak; forward perpendicular
Asst.	assistant	Fr.	frame
Bat.	batten	Freebd.	freeboard
B. E.	beveled edge	Garbd. Stk.	garboard strake
Bev. Bd.	bevel board	Gird.	girder
Bhd.	bulkhead	H. L.	horizontal line
B. K.	bilge keel; same as Rol K	Hlf. Bdth.	half breadth
Bkt.	bracket	H. P.	hawse pipe
B. L.	base line	H. R.	half round
Boss. Fr. Aft.	bossed frames aft.	I.	I-beam
Boss. Plt.	boss plate	I. D.	inside diameter
Br. Dk.	bridge deck	Inbd.	inboard
Bt. Dk.	boat deck	In. Bot.	inner bottom
Car.	carpenter	Jog.	joggle
C. Fr.	cant frame	K.	keel
Ck.	countersink	K. P.	king post
Ck O.	countersink other side	L.	line
C. L.	centerline	L. B. P.	length between perpendiculars
C. P.	coaling port	Ldg.	landing
Dia.	diameter	L. Dk.	lower deck
Diag. L.	diagonal line	Lkr.	locker
Div.	division	L. L. L.	light loadline
Dk.	deck	L. O. A.	length overall
Dr.	door	Longl.	longitudinal
D. T.	dusttight	L. W. L.	load waterline
Elev.	elevation	Marg. Plt.	margin plate
Emerg.	emergency	M. Dk.	main deck
Eng.	engine	Mk.	mark
Eng. Rm. Bhd.	engine room bulkhead	M. L.	molded line
Exp. T.	expansion tank	Mld.	molded
F. B.	flat bar	Mld. Bdth.	molded breadth
F. Cant.	forward cant frames		
F. K.	flat keel		

Mld. Dpth.	molded depth	S. P.	sternpost
M. P.	mooring pipe	Sq.	square
O. D.	outside diameter	S. R.	stateroom
Op.	operator	Stgr.	stringer
O. T.	oiltight	Stiff.	stiffener
Out. Bd.	outboard	St. M.	set mark
Pant. Stgr.	panting stringer	S. W. L.	safe working load
P. Dk.	poop deck	Sw. Pl.	swash plates
Perp.	perpendicular	T.	top
P. Mk.	pitch mark	Temp.	template
Prot. Dk.	protective deck	Tk.	tank
Qtrs.	quarters	Trans. Gird.	transverse girder
Rad.	radius	T. S.	topside
Rivs.	rivets	T. T.	tank top
Rm.	room	Up. Dk.	upper deck
Rol. K.	rolling keel	Vert.	vertical
S. A.	shaft alley	V. K.	vertical keel
Scr. Bhd.	screen bulkhead	W. L.	waterline
Set. Tk.	settling tank	W. T.	watertight
Shltr. Dk.	shelter deck	W. T. Fit	watertight fit

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NG: State AG (3); units—same as Active Army except allowance is one copy to each.

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For explanation of abbreviations used, see AR 320-50.

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